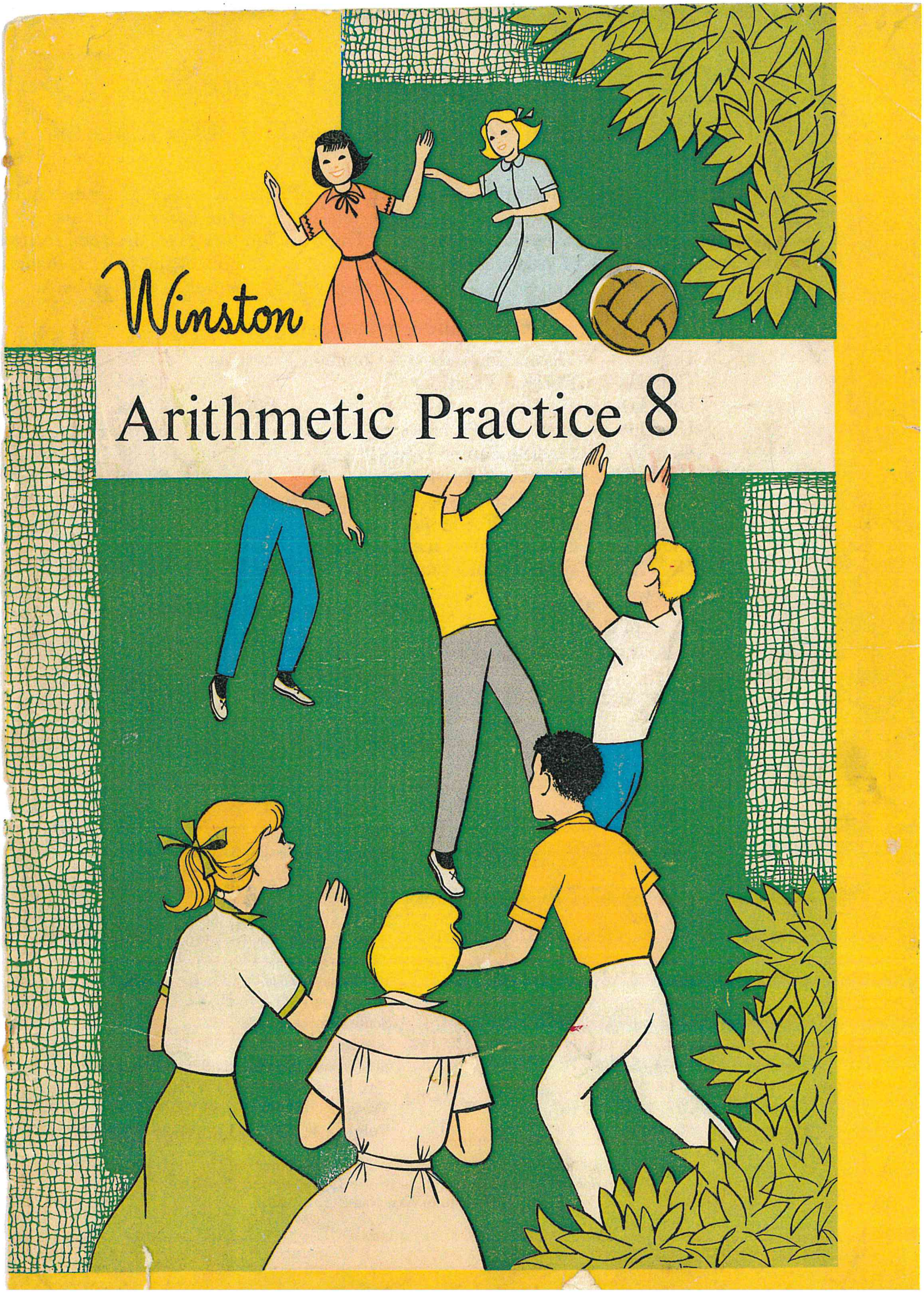
Winston

Arithmetic Practice 8



Winston Arithmetic Practice 8

Leo J. Brueckner • Foster E. Grossnickle • Elda L. Merton

Winston Arithmetic Practice provides practice in the arithmetic processes. It is related to the Winston Arithmetics of comparable grade by means of page references placed in parentheses ( ) after each page title or subtitle. A complete listing of this correlation is on the inside back cover.

There are ten test pages designed to cover the work in the unit of the practice book or corresponding chapter in the textbook.

Contents and Content Analysis

Unit I	Whole Numbers and Common Fractions	1–26
Unit II	Decimal Fractions	27–46
Unit III	Per Cent	47–64
Unit IV	Areas and Perimeters	65–80
Unit V	Finding Simple Interest	81–88
Unit VI	Interest and Insurance	89–98
Unit VII	Geometric Constructions and Graphs	99–110
Unit VIII	Solids and Volume	111–124
Unit IX	Cost of Government – Taxes	125–132
Unit X	Ratio, Measurement, and Equations	133–144

Angles, 69, 70, 75, 76, 78, 79

Approximation, 4, 5, 19, 43, 62

Area, 65, 66, 68, 70, 71, 73, 74, 117, 122

Circumference, 72

Decimals, 27, 28, 29, 30, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 45, 48, 95

Discount, 60, 61, 84

Equations, 136, 137, 138, 139

Formula, 65, 70, 71, 72, 73, 78, 81, 90, 111, 114, 116, 118, 119, 120, 139

Fractions, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 24, 49

Fundamental Operations, relationships between, 6
- addition, 5, 25, 44, 63, 77, 87, 97, 103, 109, 123, 131, 143
- division, 8, 9, 10, 11, 25, 44, 63, 77, 87, 97, 103, 109, 123, 131, 143
- multiplication, 7, 25, 44, 63, 77, 87, 97, 103, 109, 123, 131, 143
- subtraction, 5, 25, 44, 63, 77, 87, 97, 103, 109, 123, 131, 143

Geometric Constructions and Figures, 65, 66, 68, 69, 70, 71, 72, 73, 74, 75, 76, 78, 79, 99, 100, 101, 102, 111, 112, 113, 114, 116, 117, 118, 119, 122, 142

Geometry, checking on, 108
- reviewing, 78, 79, 90, 142

Graphs, 75, 76, 79, 105, 106, 107, 108

Insurance, 94, 95, 96

Interest, 81, 82, 83, 85, 86, 89

Magic Squares, 16, 115

Mark-Up, 59

Measurements, 17, 42, 43, 120, 121, 126, 133

Net Cost, 60

Number Quickies, 9, 22, 29, 57, 62, 67, 91, 115

Per Cent, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 60, 61, 67, 101, 129
- equivalents, 48, 49, 58
- meaning, 47
- reviewing, 141

Perimeter, 65

Place Value, 2, 27, 31, 103, 129

Problems, 1, 2, 3, 6, 8, 11, 15, 17, 23, 24, 30, 32, 33, 34, 38, 39, 43, 45, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 59, 60, 61, 65, 66, 69, 70, 72, 73, 74, 78, 79, 81, 82, 83, 84, 85, 86, 89, 90, 91, 92, 93, 94, 95, 96, 100, 102, 116, 117, 118, 121, 122, 127, 128, 130, 133, 134, 135, 141

Ratio, 23, 53, 133, 134, 135

Rounding Off, 4, 5, 29, 41

Scale Drawing, 104

Square Root, 140

Stocks and Bonds, 91, 92

Tax Rates, 125, 126, 127, 128, 130

Tests, 26, 46, 64, 80, 88, 98, 110, 124, 132, 144

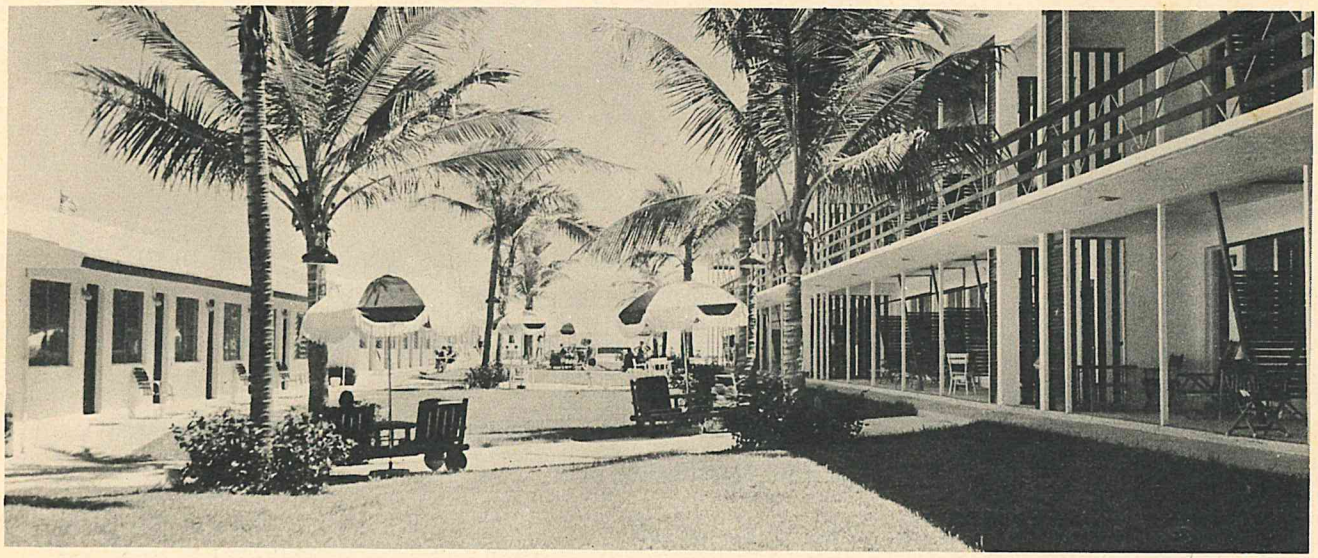
Volume, 111, 112, 113, 114, 116, 118, 119, 122

© Copyright, 1957, by Holt, Rinehart and Winston, Inc.
Copyright in Great Britain and the British Dominions and Possessions
PRINTED IN THE UNITED STATES OF AMERICA

41134-1827

Unit I. Whole Numbers and Common Fractions

New York to Los Angeles (1)



H. Armstrong Roberts

Four members of the Brooks family drove their car from New York to Los Angeles. The distance was 3,040 miles.

1. The family made the trip in 8 days. What was the average mileage per day? — 1. 380 miles

2. At an average of 16 miles per gallon of gasoline, how many gallons were consumed on the trip? — 2. 190 gals.

3. At an average of 34¢ per gallon, find the cost of 190 gallons of gasoline. — 3. $64.60 gals

4. The average cost of the food was $3.45 per person per day. Find the cost of the food for 4 persons for 8 days. — 4. $110.40

5. The expenses of the trip included the following:

   a. Gasoline and oil — 5a. $67.30

   b. Food (Problem 4) — 5b. $110.40

   c. Lodging for 7 nights at an average of $9.50 per night — 5c. $66.50

   d. 6 rolls of colored film at $1.96 per roll — 5d. $11.76

   e. Miscellaneous — 5e. 17.64

   f. Total — 5f. $273.60

6. From problem 5, what was the average cost of the trip per day for the 8 days? — 6. $34.20 per day

I. Understanding Our Number System (2)

1. three — The 2 on the right is in ones' place. How many places to the left of ones' place is thousands' place?

2. ten thousands — What is the name of the place four places to the left of ones' place?

3. There are how many places in a number expressed:

3a. 4 places — a. as thousands?

3b. 7 places — b. as millions?

4. ten millions — Write the name of the place one place to the left of millions' place.

5. 1,000,000,000 — The name of the place three places to the left of millions' place is billions' place. Write one billion with figures.

6. 10 places — There are how many places in a number expressed as billions?

7. 9,999 — Think of the largest three-place number. Now write the next larger whole number.

8. 999 — Think of the smallest four-place whole number. Now write the next smaller whole number.

9. With figures write:

9a. 1,010 — a. The number which is 10 more than the largest three-place whole number

9b. 1,000 — b. The number which is 100 more than the smallest three-place whole number

9c. 2,000 — c. The number which is twice as large as the smallest four-place whole number

9d. 1,000,000 — d. A thousand thousands.

II. A Place-Value Puzzle with Letters (2)

The letters A, E, L, S, and V can be arranged to form several words. Each letter except S has a value of zero. The value of S is 1.

1. one — What value would be represented by the word VALES?

2. slave, salve — Form a word with the letters given so that the value represented would be 10,000.

I. Representing Numbers on a Scale (4)

1. The line shown is 5 inches long. What number does one inch represent? 1. 100

2. What number does a distance of 4 inches on the line represent? 2. 400

3. To the nearest 100, the number represented by a line $2\frac{1}{4}$ inches long is 200. To the nearest 100, what would be the number represented by a line $2\frac{3}{4}$ inches long? 3. 300

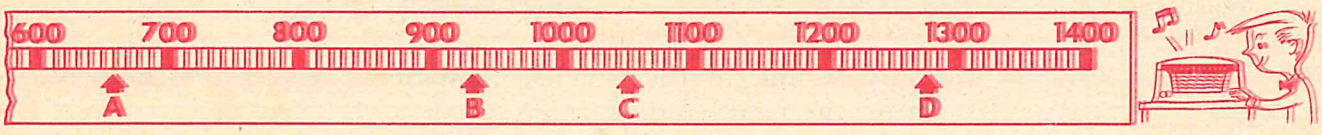
4. To the nearest 100, the number represented by a line $1\frac{1}{2}$ inches long is 200. To the nearest 100, what would be the number represented by a line $3\frac{1}{2}$ inches long? 4. 400

5. Suppose an inch represents 1000. To the nearest 1000, write the number that would be represented by a line having:

a. A length of $1\frac{1}{4}$ in. 5a. 1,000

b. A length of $3\frac{3}{4}$ in. 5b. 4,000

II. Reading Numbers on a Dial (4)



The diagram shows a radio dial.

1. What is the: **a.** smallest number shown?
b. largest number shown? 1. a. 600 b. 1400

2. Write the station numbers represented by the letters shown on the dial. 2. A. 606 B. 903 C. 1005 D. 1208

3. To the nearest 100, write the numbers represented by the letters shown on the dial. 3. A. 700 B. 900 C. 1100 D. 1300

4. Suppose the letter **A** on the dial shown were between 6,000 and 7,000. To the nearest 1000, what number would **A** represent? 4. 7,000

5. A line $3\frac{1}{2}$ inches long represents 3,500. One inch on the line represents what number? 5. 1,000

6. If a line 1 inch long represents 1,000, what number would a line $4\frac{3}{4}$ inches long represent? 6. 4300

Approximate Numbers (4)

A

B

Each diagram shows the number of registrations of motor vehicles in this country in 1954.

1. A — **1.** Which diagram gives the exact number of registrations?

2. 59,000,000 — **2.** To the nearest million, what was the number of registrations in 1954?

3. 58,500,000 — **3.** Round off the number in diagram **A** to the nearest hundred thousand. Write this number.

4. 7,000 — **4.** To the nearest 1000, the value of 6,449 is 6,000. To the nearest 1000, what is the value of 6,500?

Round off each number to the nearest 100; to the nearest 1000:

		To the nearest: 100	1000
5.	8640	8,600	9,000
6.	9350	9,400	9,000
7.	5725	5,800	6,000
8.	6449	6,400	6,000
9.	4050	4,050	4000

		To the nearest: 100	1000
10.	12,490	12,400	12,000
11.	25,680	25,700	26,000
12.	43,370	43,400	43,000
13.	59,950	60,900	60,000
14.	63,449	63,400	63,000

A whole number, rounded off to the nearest 100, has a value of 700. Before the number was rounded off, the greatest value it could have had was 749. The least value the number could have had was 650.

15. Find the missing whole numbers in the table.

	Number Rounded off to nearest 100	Before Rounded Off: Least Value	Greatest Value
a.	300	250	349
b.	500	450	599
c.	1200	1150	1249
d.	2000	1950	2049

	Number Rounded off to nearest 1000	Before Rounded Off: Least Value	Greatest Value
e.	4000	3500	4499
f.	6000	5500	6499
g.	25,000	24500	25,499
h.	70,000	69500	70,499

I. Testing to See If the Answer Is Sensible (7)

Find the sum in each example below. Round off each number in an example to the nearest 100. Add these rounded numbers. If the two sums are approximately the same, the answer is sensible. See example **1a**. If the two sums are not approximately the same, go over your work to find the error.

	a		b		c	
1.	713	700	456	500	735	700
	956	1000	938	900	289	300
	387	400	759	800	2680	3000
	945	900	477	500	639	600
	2992	3000	2,614	2,700	4,443	4,600

2. Add. Then round off the numbers to the nearest 1000 and add. Check to see if the sum of each example is sensible.

8537	9,000	35,74	4,000
6961	7,000	4187	4000
9590	10,000	7615	8000
2117	2,000	3943	4000
27,205	28,000	19,329	20,000

7327	7,000
1568	2000
18,430	18000
4974	5000
32,199	32,000

3. Subtract in the examples below. Round off the numbers to the nearest 1000 to subtract to see if the answers are sensible.

8156	8000	3426	3,000
2883	3000	1875	2000
5273	5000	1,451	1,000
8,146	8000		3,000

19,014	19000
17,348	17,000
1,666	2,000
19,014	

II. Practicing Addition and Subtraction (8)

Find the answers below. Check mentally with round numbers.

	a	b	c	d
1.	478	756	542	$24.86
	549	918	367	9.45
	367	806	995	14.87
	738	625	874	8.50
	2,132	3,105	2,778	57.68
2.	4356	3728	10,375	53,440
	−1295	−1465	− 9,408	− 8,765
	3061	2263	967	44,675
	4,356	3,728	10,375	53,440
3.	5631	4025	72,367	10,100
	− 547	− 46	−41,836	− 578
	5,084	3979	30,531	9,522
	5,631	4,025	72,367	10,100

Relationships between Addition and Subtraction (9)

23	27	50

1. One addition example using the numbers in the box is 23 + 27 = 50. Write the other addition example using these numbers.

1. 50

2. See problem 1. One subtraction example using the numbers in the box is 50 − 23 = 27. Write the other subtraction example.

2.

45	65	110

3. Use the numbers in the box on the right. Write two examples, each representing a different process.

3.

4. Use example **A**. What will be the answers to the two examples in subtraction in which these numbers are used?

4. 7436
1857

A.
7436
+1857
9293

5. Use example **B**. What will be the sum of each of the two corresponding examples in addition in which these numbers are used?

5. 5599

B.
3425
−1478
1947

Without subtracting in rows **6** and **7** below, write the letter of the example in which the missing numbers will be: Largest (L); Smallest (S). Now subtract to see if your answers are right.

	a	b	c	d	e
6. (L) b	940	940	940	940	940
	−375	−186	−745	−402	−236
(S) c	565	754	195	538	704
	940	940	940	940	940
7. (L) c	182	250	117	406	378
	+318	+250	+383	+ 94	+122
(S) d	500	500	500	500	500

8. One number is 27 more than another number. The smaller of the two numbers is 36.

8a. 36

a. What is the larger number?

8b. 27

b. What is the sum of the numbers?

9. 268

9. The sum of two numbers is 721. One of the numbers is 458. What is the other number?

Thurs. 4:00

Making Sure of Multiplication (10)

In order to multiply well, you must know the multiplication facts, as $3 \times 7 = 21$. Also, you must be able to add a number to be carried to a product, as $4 \times 7 + 3 = 31$.

1. Write two related multiplication groupings which have a product of:

a. 32	4 × 8	8 × 4	d. 36	6×6	6×6	g. 72	8×9	9×8
b. 54	9×6	6×9	e. 56	8×7	7×8	h. 42	7×6	6×7
c. 48	8×6	6×8	f. 27	3×9	9×3	i. 63	7×9	9×7

Find the following:

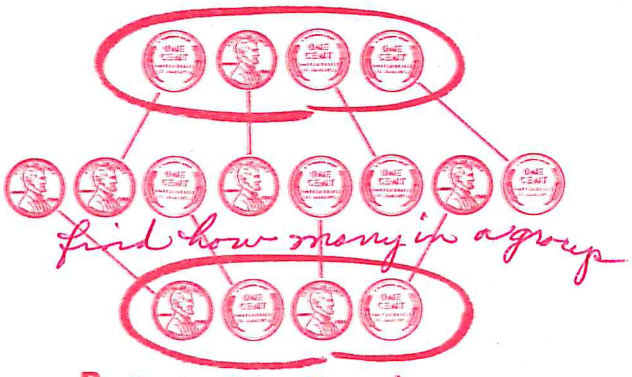
	a	b	c
2.	$6 \times 7 + 4 = 46$	$8 \times 5 + 7 = 47$	$9 \times 4 + 6 = 42$
3.	$7 \times 8 + 5 = 61$	$6 \times 9 + 4 = 58$	$9 \times 6 + 7 = 63$
4.	$8 \times 4 + 7 = 39$	$7 \times 7 + 5 = 54$	$8 \times 8 + 7 = 71$
5.	$5 \times 9 + 4 = 49$	$4 \times 7 + 3 = 31$	$6 \times 0 + 4 = 10$
6.	$9 \times 2 + 6 = 24$	$8 \times 6 + 5 = 53$	$9 \times 9 + 6 = 87$

Find the products in the following:

	a	b	c	d
7.	584 × 8 = 4672	936 × 4 = 3744	807 × 9 = 7263	968 × 7 = 6,776
8.	95 × 74 = 6630 + 380 = 7010	68 × 37 = 476 + 2040 = 2516	536 × 86 = 3216 + 42880 = 46,096	708 × 59 = 6372 + 35400 = 41,772
9.	738 × 400 = 296,200	687 × 308 = 5496 + 206100 = 211,596	450 × 370 = 3150 + 133500 = 166,500	956 × 704 = 3824 + 669200 = 673,024

I. The Meaning of Division (13)

A. Taking 2 away at a time



B. Sorting 8 into 2 equal groups

In **A** we divide to find **how many groups of 2 cents each** there are in 8 cents, as $2¢\overline{)8¢}^{\,4}$. The answer is 4, the number of groups, and not 4¢.

In **B** we divide to find **the number of cents in each group** when we divide 8 cents into two equal groups, as $2\overline{)8¢}^{\,4¢}$. The answer is 4¢ and not 4 groups.

Solve the following problems. On the first blank write the answer; on the second blank write the kind of division (**A** or **B**) represented by the problem.

1. 6 A — **1.** Tom can put 20 stamps on a page of his stamp book. How many pages can he fill with 120 stamps?

2. 25 A — **2.** How many 6-cent postage stamps can be bought for $1.50?

3. 8 B — **3.** Miss Ryan has 40 bulbs to plant in five equal rows. How many bulbs should she plant in each row?

4. 15½ B — **4.** A car used 20 gallons of gasoline on a trip of 360 miles. What was the average number of miles per gallon?

5. 18 A — **5.** There are how many dozen oranges in a box containing 216 oranges?

6. 12 B — **6.** There are how many gallons in 30 quarts?

II. Dividing by a One-Place Divisor (13)

Find the quotients. If there is a remainder, write it as a remainder and not as a fraction.

	a	b	c	d
1.	$4\overline{)936}$ 234	$5\overline{)3702}$ 740 R2	$9\overline{)6821}$ 760 R1	$6\overline{)4127}$ 691 R1
2.	$7\overline{)3005}$ 429 R2	$8\overline{)3925}$ 490 R5	$7\overline{)5312}$ 758 R7	$9\overline{)5170}$ 574 R4
3.	$8\overline{)5923}$ 740 R3	$6\overline{)3739}$ 623 R1	$5\overline{)4924}$ 985 R4	$4\overline{)2923}$ 730 R3

I. Division with a One-Place Divisor (14)

Find the quotients. Write the remainder as a remainder and not as a fraction.

	a	b	c	d
1.	6)7818 → 1303	4)7643 → 1906 R7	3)2040 → 680	5)9704 → 1940 R4
2.	8)3104 → 388	9)6170 → 685 R8	6)5173 → 862 R1	8)3925 → 490 R5
3.	7)4932 → 704 R4	9)2112 → 234 R6	6)2045 → 340 R5	7)5074 → 724 R6
4.	8)5040 → 630	7)4002 → 572 R 19	8)9000 → 1125	9)6037 → 670 R7

II. Number Quickies (14)

1. There are how many tens in 720? 1. 72

2. There are how many thousands in a million? 2. 25

3. There are how many millions in a billion? 3. 25

4. Lemons sell 3 for 14¢. At that rate, find the cost of a dozen lemons. 4. 56¢

5. There are how many quarts in $2\frac{1}{2}$ gallons? 5. 10 qt.

6. A sheet of postage stamps contains 100 stamps. Find the cost of 3 sheets of 2-cent stamps. 6. $6.00

7. What is the perimeter (distance around) of a square 6 inches on a side? 7. 24 in.

8. A boy is 4 ft. 9 in. tall. Express his height in inches. 8. 45 in.

I. The Estimated Quotient Is the True Quotient (16)

Find the quotients:

	a	b	c	d
1.	46)1058	36)1476	52)8847	95)6038
2.	67)3489	45)4700	64)3472	84)4561
3.	24)769	33)1359	54)1461	73)2789

II. The Estimated Quotient Is Not the True Quotient (16)

Find the quotients:

	a	b	c	d
1.	56)2540	84)7230	95)6348	38)3654
2.	14)7856	16)9127	34)28,240	37)35,896
3.	48)18,861	66)38,696	93)63,691	56)46,103

Division with a Three-Place Divisor (17)

1. A family has a yearly income of $5,400. Assume a year of 360 days. What is the average daily income?

$360\overline{)\$5\,4\,0\,0}$

The income must be more than $10 per day as $360 \times \$10 = \$3{,}600$.

Think: $3\overline{)5}$ is 1 with a remainder. Then 1 represents 1 ten.

Now think: $3\overline{)18}$ is 6. 6×360 is too large. Try 5.

Find the quotients. **A.** The estimated quotient is the true quotient:

	a	b	c
2.	$365\overline{)\$1\,4\,6\,0}$	$223\overline{)\$7\,8\,0\,5}$	$612\overline{)5\,1{,}7\,3\,6}$
3.	$425\overline{)3\,0\,4\,5}$	$672\overline{)9\,4\,3\,8}$	$724\overline{)3\,8{,}5\,6\,0}$

B. The estimated quotient is not the true quotient:

4.	$348\overline{)1\,2\,5\,6}$	$354\overline{)9\,2\,7\,5}$	$245\overline{)1\,2{,}3\,5\,0}$
5.	$463\overline{)8\,7\,4\,5}$	$285\overline{)9\,1\,5\,0}$	$180\overline{)\$7\,7\,4\,0}$

6. The combined weight of the 11 members of a football team was 1,837 pounds. What was the average weight of the players?

6. _____

7. What must be the family yearly income to have an average income of $18 per day for a year of 365 days?

7. _____

I. Changing Fractions to Equivalent Fractions (21)

Fractions having the same value, such as $\frac{1}{2}$ and $\frac{3}{6}$, are **equivalent fractions.** The fraction, $\frac{3}{6}$, expressed as $\frac{1}{2}$ is **reduced to lowest terms.**

Reduce to lowest terms:

	a	b	c	d	e	f
1.	$\frac{6}{15} = \frac{2}{5}$	$\frac{9}{30} = \frac{3}{10}$	$\frac{10}{12} = \frac{5}{6}$	$\frac{9}{18} = \frac{3}{6} = \frac{1}{2}$	$\frac{12}{24} = \frac{1}{2}$	$\frac{14}{16} = \frac{7}{8}$
2.	$\frac{12}{30} = \frac{2}{5}$	$\frac{28}{32} = \frac{7}{8}$	$\frac{32}{40} = \frac{4}{5}$	$\frac{18}{24} = \frac{3}{4}$	$\frac{14}{20} = \frac{7}{10}$	$\frac{16}{24} = \frac{2}{3}$
3.	$\frac{15}{24} = \frac{5}{8}$	$\frac{10}{15} = \frac{2}{3}$	$\frac{9}{21} = \frac{3}{7}$	$\frac{20}{24} = \frac{5}{6}$	$\frac{24}{30} = \frac{4}{5}$	$\frac{15}{36} = \frac{5}{12}$

4. Change $\frac{7}{8}$ to 16ths.

$\frac{7}{8} = \frac{?}{16}$ $\quad \frac{2 \times 7}{2 \times 8} = \frac{14}{16}$

Multiply both terms of $\frac{7}{8}$ by 2, because $8\overline{)16} = 2$.

Find the missing numbers:

	a	b	c	d	e
5.	$\frac{3}{4} = \frac{12}{16}$	$\frac{9}{10} = \frac{18}{20}$	$\frac{5}{8} = \frac{10}{16}$	$\frac{4}{5} = \frac{16}{20}$	$\frac{1}{6} = \frac{4}{24}$
6.	$\frac{11}{12} = \frac{22}{24}$	$\frac{3}{8} = \frac{12}{32}$	$\frac{3}{5} = \frac{9}{15}$	$\frac{2}{3} = \frac{12}{18}$	$\frac{7}{10} = \frac{14}{20}$
7.	$\frac{3}{8} = \frac{9}{24}$	$\frac{2}{3} = \frac{12}{18}$	$\frac{5}{8} = \frac{20}{32}$	$\frac{4}{5} = \frac{12}{15}$	$\frac{2}{3} = \frac{18}{27}$

II. Changing Improper Fractions to Mixed Numbers (21)

	a	b	c	d	e
1.	$\frac{5}{2} = 2\frac{1}{2}$	$\frac{9}{4} = 2\frac{1}{4}$	$\frac{11}{3} = 3\frac{2}{3}$	$\frac{14}{4} = 3\frac{2}{4} = 3\frac{1}{2}$	$\frac{10}{6} = 1\frac{4}{6}$
2.	$\frac{15}{6} = 2\frac{3}{6}$	$\frac{13}{4} = 3\frac{1}{4}$	$\frac{7}{2} = 3\frac{1}{2}$	$\frac{20}{8} = 2\frac{4}{8}$	$\frac{24}{10} = 2\frac{4}{10}$
3.	$\frac{9}{6} = 1\frac{3}{6}$	$\frac{15}{12} = 1\frac{3}{12}$	$\frac{18}{12} = 1\frac{6}{12} = 1\frac{1}{2}$	$\frac{15}{9} = 1\frac{6}{9}$	$\frac{10}{8} = 1\frac{2}{8}$

I. Changing the Form of Mixed Numbers (21)

1. Change $2\frac{1}{4}$ to an improper fraction.

$2\frac{1}{4} = \frac{4}{4} + \frac{4}{4} + \frac{1}{4}$, or $\frac{9}{4}$ or $2 \times \frac{4}{4} + \frac{1}{4} = \frac{9}{4}$

Find the missing numbers in the following:

	a	b	c	d
2.	$3\frac{1}{2} = \frac{2}{2} = \frac{1}{2} = \frac{7}{4}$	$1\frac{3}{4} = \frac{4}{4}$	$3\frac{3}{4} = \frac{4}{4}$	$2\frac{3}{5} = \frac{5}{5} \times \frac{3}{5} \frac{15}{25}$
3.	$1\frac{2}{4} = \frac{4}{4} : \frac{2}{4} = \frac{6}{8}$	$1\frac{3}{6} = \frac{6}{6}$	$2\frac{3}{8} = \frac{8}{8}$	$4\frac{2}{3} = \frac{3}{3} = \frac{6}{9}$
4.	$4 = 3\frac{2}{2} = \frac{1}{3} = \frac{9}{13}$	$5 = 4\frac{3}{3}$	$6 = \frac{8}{8} = \frac{46}{46}$	$2 = \frac{6}{6} = \frac{12}{12}$
5.	$2\frac{1}{2} = 1\frac{2}{2}$	$1\frac{1}{3} = \frac{3}{3}$	$7\frac{1}{2} = 6\frac{2}{2}$	$5\frac{1}{4} = 4\frac{4}{4} = \frac{5}{16}$
6.	$3\frac{1}{2} = 2\frac{4}{4}$	$4\frac{1}{6} = 3\frac{12}{12}$	$2\frac{1}{4} = 1\frac{8}{8}$	$8\frac{1}{4} = 7\frac{12}{12} = \frac{12}{12}$

II. True or False (21)

Write your answers on the blanks. If a statement always is true, mark **T**; if sometimes true and sometimes false, mark **S**; if always false, mark **F**. Give an illustration to prove your answer.

1. A fraction having a numerator of 1 is not always expressed in lowest terms. — 1. F

2. An improper fraction is greater than one whole. — 2. F

3. Three fractions have unlike denominators. The fraction having the largest denominator is smallest in value. — 3. I

4. Three fractions have unlike numerators. The fraction having the largest numerator is largest in value. — 4. F

5. If two fractions are equivalent, one of the fractions is not expressed in lowest terms. — 5. I

6. The product of the denominators of any two unlike fractions is the lowest common denominator of the fractions. — 6. F

7. The product of the denominators of any two unlike fractions always is a common denominator of the fractions. — 7. F

Addition of Common Fractions (22)

I. Like Fractions

Add. Express the answer in simplest form.

	a	b	c	d	e
1.	$\frac{1}{3}$	$\frac{2}{5}$	$1\frac{3}{8}$	$3\frac{5}{9}$	$4\frac{9}{16}$
	$\frac{1}{3}$	$\frac{1}{5}$	$9\frac{4}{8}$	$7\frac{2}{9}$	2
	$\frac{2}{3}$	$\frac{3}{5}$	$10\frac{7}{8}$	$10\frac{7}{9}$	$6\frac{9}{16}$
2.	$\frac{3}{4}$	$\frac{5}{7}$	$6\frac{2}{3}$	$9\frac{4}{5}$	$5\frac{3}{8}$
	$\frac{2}{4}$	$\frac{4}{7}$	$8\frac{2}{3}$	$7\frac{1}{5}$	$\frac{4}{8}$
	$\frac{5}{4}$ $1\frac{1}{4}$	$\frac{9}{7}=1\frac{2}{7}$	$14\frac{4}{3}=15\frac{1}{3}$	$16\frac{5}{5}=17$	$5\frac{7}{8}$
3.	$\frac{7}{8}$	$\frac{5}{9}$	$2\frac{7}{12}$	$9\frac{1}{4}$	$8\frac{5}{6}$
	$\frac{5}{8}$	$\frac{7}{9}$	$4\frac{11}{12}$	$5\frac{3}{4}$	$\frac{5}{6}$
	$\frac{12}{8}=1\frac{4}{8}$	$\frac{12}{9}=1\frac{3}{9}$	$6\frac{17}{12}=7\frac{5}{12}$	$14\frac{4}{4}=15$	$8\frac{10}{6}=$

II. Unlike Fractions

	a	b	c	d
1.	$\frac{1}{2}=\frac{4}{8}$	$\frac{1}{2}$ $\frac{8}{16}$	$1\frac{5}{8}=1\frac{5}{8}$	$4\frac{7}{16}=4\frac{7}{16}$
	$\frac{3}{8}=\frac{3}{8}$	$\frac{9}{16}$ $\frac{9}{16}$	$6\frac{3}{4}=6\frac{6}{8}$	$\frac{3}{4}=\frac{12}{16}$
	$\frac{7}{8}$	$\frac{17}{16}=1\frac{1}{16}$	$7\frac{1}{8}$	$4\frac{11}{16}$
2.	$\frac{1}{2}=\frac{3}{6}$	$\frac{2}{3}=\frac{8}{12}$	$9\frac{2}{3}=9\frac{4}{6}$	$5\frac{1}{3}=5\frac{4}{12}$
	$\frac{1}{6}=\frac{1}{6}$	$\frac{7}{12}=\frac{7}{12}$	$\frac{5}{6}=\frac{5}{6}$	$2\frac{11}{12}=2\frac{11}{12}$
	$\frac{4}{6}$	$\frac{15}{12}=1\frac{3}{12}$	$9\frac{9}{6}$	$7\frac{15}{12}=8\frac{3}{12}$
3.	$\frac{5}{6}=\frac{10}{12}$	$\frac{5}{6}=\frac{20}{24}$	$4\frac{1}{6}=4\frac{4}{24}$	$9\frac{1}{6}=9\frac{4}{24}$
	$\frac{3}{4}=\frac{9}{12}$	$\frac{1}{8}=\frac{3}{24}$	$5\frac{3}{4}=5\frac{18}{24}$	$4\frac{5}{9}=4\frac{40}{72}$
	$\frac{19}{12}=1\frac{7}{12}$	$\frac{23}{24}$	$9\frac{22}{24}$	$13\frac{13}{72}$
4.	$\frac{1}{2}=\frac{6}{12}$	$\frac{1}{3}=\frac{4}{12}$	$7\frac{1}{4}=7\frac{2}{8}$	$6\frac{3}{4}=6\frac{18}{24}$
	$\frac{3}{4}=\frac{9}{12}$	$\frac{1}{6}=\frac{2}{12}$	$3\frac{1}{8}=3\frac{1}{8}$	$1\frac{2}{3}=1\frac{16}{24}$
	$\frac{5}{6}=\frac{10}{12}$	$\frac{1}{4}=\frac{3}{12}$	$9\frac{1}{2}=9\frac{4}{8}$	$4\frac{5}{8}=4\frac{15}{24}$
	$\frac{25}{12}$	$\frac{10}{12}$	$18\frac{9}{8}=19\frac{1}{8}$	$11\frac{40}{24}=12$

Subtraction of Fractions - No Regrouping (25)

I. Like Fractions

Subtract. Express each answer in lowest terms.

	a	b	c	d	e
1.	$\frac{7}{8}$	$\frac{7}{9}$	$6\frac{2}{3}$	$5\frac{3}{4}$	$9\frac{1}{6}$
	$\frac{4}{8}$	$\frac{2}{9}$	$4\frac{1}{3}$	4	$7\frac{1}{6}$
	$\frac{3}{8}$	$\frac{5}{9}$	$2\frac{1}{3}$	$1\frac{3}{4}$	2
2.	$\frac{11}{12}$	$\frac{9}{16}$	$8\frac{3}{4}$	$7\frac{5}{6}$	$11\frac{7}{8}$
	$\frac{5}{12}$	$\frac{5}{16}$	$5\frac{1}{4}$	$7\frac{1}{6}$	$4\frac{5}{8}$
	$\frac{6}{12}$	$\frac{4}{16}$	$3\frac{2}{4}$	$\frac{4}{6}$	$7\frac{2}{8}$

II. Unlike Fractions

	a	b	c	d
1.	$\frac{7}{10} = \frac{7}{10}$	$\frac{15}{16} = \frac{15}{16}$	$10\frac{3}{4} = 10\frac{3}{4}$	$13\frac{5}{6} = 13\frac{5}{6}$
	$\frac{2}{5} = \frac{4}{10}$	$\frac{3}{4} = \frac{12}{16}$	$7\frac{1}{2} = 7\frac{2}{4}$	$8\frac{2}{3} = 8\frac{4}{6}$
	$\frac{3}{10}$	$\frac{3}{16}$	$3\frac{1}{4}$	$5\frac{1}{6}$
2.	$\frac{7}{12} = \frac{7}{12}$	$\frac{2}{3} = \frac{4}{6}$	$6\frac{3}{4} = 6\frac{9}{12}$	$9\frac{5}{6} = 9\frac{5}{6}$
	$\frac{1}{3} = \frac{4}{12}$	$\frac{1}{6} = \frac{1}{6}$	$1\frac{7}{12} = 1\frac{7}{12}$	$9\frac{1}{2} = 9\frac{3}{6}$
	$\frac{3}{12} = \frac{1}{4}$	$\frac{2}{6} = \frac{1}{2}$	$5\frac{2}{12} = 5\frac{1}{6}$	$\frac{4}{6} = \frac{2}{3} = \frac{1}{2}$
3.	$\frac{1}{2} = \frac{5}{10}$	$\frac{3}{4} = \frac{9}{12}$	$11\frac{1}{2} = 11\frac{3}{6}$	$7\frac{2}{3}$ $7\frac{10}{15}$
	$\frac{2}{5}$ $\frac{4}{10}$	$\frac{2}{3} = \frac{8}{12}$	$6\frac{1}{3} = 6\frac{2}{6}$	$6\frac{1}{5}$ $6\frac{3}{15}$
	$\frac{1}{10}$	$\frac{1}{12}$	$5\frac{1}{6}$	$1\frac{7}{15}$
4.	$\frac{7}{8} = \frac{21}{24}$	$\frac{5}{6} = \frac{20}{24}$	$9\frac{3}{8} = 9\frac{9}{24}$	$12\frac{7}{10} = 12\frac{42}{60}$
	$\frac{5}{6} = \frac{20}{24}$	$\frac{3}{4} = \frac{18}{24}$	$7\frac{1}{6} = 7\frac{4}{24}$	$4\frac{1}{6} = 4\frac{10}{60}$
	$\frac{1}{24}$	$\frac{2}{24} = \frac{1}{12}$	$2\frac{5}{24}$	$8\frac{32}{60}$

5. The sum of two numbers is $21\frac{7}{8}$. One of the numbers is $12\frac{1}{2}$. What is the other number?

5. 9

6. A board $7\frac{3}{4}$ feet long is sawed into two pieces. One piece is $5\frac{1}{2}$ feet long. What is the length of the other piece?

6. 2

I. Subtraction of Mixed Numbers - Regrouping (26)

Subtract in the following examples:

	a	b	c	d
1.	$4 = 3\frac{3}{3}$ $1\frac{2}{3} = 1\frac{2}{3}$ $2\frac{1}{3}$	$5 = 4\frac{8}{8}$ $4\frac{7}{8} = 4\frac{7}{8}$ $\frac{1}{8}$	$9 = 9\frac{5}{5}$ $1\frac{4}{5} = \frac{14}{8}\frac{5}{5}$	$10 = 9\frac{3}{3}$ $9\frac{1}{3} = 9\frac{1}{3}$ $\frac{2}{3}$
2.	$7\frac{1}{8} = 6\frac{9}{8}$ $4\frac{3}{8} = 4\frac{3}{8}$ $2\frac{6}{8}$	$5\frac{1}{3} = 6\frac{4}{3}$ $4\frac{2}{3} = 4\frac{2}{3}$ $2\frac{2}{3}$	$9\frac{2}{5} = 8\frac{7}{5}$ $1\frac{4}{5} = 1\frac{4}{5}$ $7\frac{3}{5}$	$12\frac{5}{8} = 11\frac{13}{8}$ $9\frac{7}{8} = 9\frac{7}{8}$ $2\frac{6}{8} =$
3.	$3\frac{1}{4} = 3\frac{1}{4} = 2\frac{2}{4}$ $1\frac{1}{2} = 1\frac{2}{4} =$ 1	$7\frac{1}{2} = 7\frac{2}{4} = 6\frac{7}{4}$ $1\frac{3}{4} = 1\frac{3}{4} = 1\frac{3}{4}$ $5\frac{4}{4} = 6$	$9\frac{1}{4} = 7\frac{2}{8} - 6\frac{10}{8}$ $2\frac{7}{8} = 2\frac{4}{8} = 2\frac{7}{8}$ $4\frac{3}{8}$	$9\frac{1}{8} = 9\frac{1}{8} = 8$ $6\frac{3}{4} = 6\frac{9}{8} = 6$ 2
4.	$8\frac{1}{6} = 8\frac{1}{6} = 8\frac{7}{6}$ $4\frac{1}{2} = 4\frac{3}{6} = 4\frac{3}{6}$ $4\frac{4}{6} = 4\frac{2}{3}$	$9\frac{1}{3} = 9 = \frac{4}{12} = 9\frac{16}{12}$ $4\frac{5}{6} = 4 = \frac{10}{12} - 4\frac{10}{12}$ $5\frac{4}{12} = 5\frac{1}{3}$	$1\frac{3}{4} = 1\frac{9}{12} = \frac{21}{12}$ $\frac{11}{12} = \frac{11}{12}$ $\frac{10}{12} = \frac{5}{6}$	$13\frac{1}{2} = 13\frac{5}{10} =$ $5\frac{7}{10} = 5\frac{7}{10} =$
5.	$4\frac{1}{2} = 4\frac{3}{6} = 3\frac{18}{6}$ $1\frac{2}{3} = 1\frac{4}{6} =$ $4\frac{14}{6}$	$7\frac{1}{2} = 7\frac{15}{2}$ $2\frac{4}{5} = 2\frac{4}{5}$ $5\frac{9}{2}$	$9\frac{1}{3} = 9\frac{19}{3}$ $6\frac{3}{4} = 6\frac{3}{3}$ $4\frac{16}{3}$	$6\frac{1}{5} = 6\frac{12}{20}$ $5\frac{3}{4} = 5\frac{3}{20}$ $1\frac{17}{20}$
6.	$1\frac{1}{4} = 1\frac{3}{12} = \frac{16}{12}$ $\frac{5}{6} = \frac{10}{12} = \frac{10}{12}$ $\frac{6}{10}$	$7\frac{1}{8}$ $1\frac{5}{6}$	$9\frac{1}{10} =$ $3\frac{1}{4}$ 60	$8\frac{1}{6} = 8\frac{6}{24}$ $4\frac{5}{9} = 4\frac{5}{9}$ $4\frac{1}{9}$

II. Completing a Magic Square

Some numbers are missing in the square. When the correct numbers are found for the vacant cells, a magic square will be formed.

1. Bottom $\frac{1}{6}$

1. In which row is it possible to find the sum of the magic square? What is the sum?

2. Find the missing numbers to make a magic square.

$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{4}$	$1\frac{1}{3}$
$\frac{1}{3}$	$1\frac{1}{4}$	$1\frac{1}{8}$	$\frac{5}{12}$
$1\frac{1}{6}$	$\frac{1}{12}$	$\frac{2}{3}$	$\frac{1}{4}$
$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{6}$

Addition and Subtraction of Measurements (28)

Find the sums:

	a	b	c
1.	4 ft. 9 in. 3 ft. 8 in. 7 ft. 17 in. = 8 ft. 5 in.	2 gal. 3 qt. 3 gal. 2 qt. 5 gal. 5 qt.	7 ft. 9 in. 6 ft. 10 in. 13 ft. 19 in.
2.	8 lb. 10 oz. 3 lb. 12 oz. 11 lb. 22 oz.	9 min. 45 sec. 4 min. 25 sec. 13 min. 70 sec.	1 yd. 18 in. 4 yd. 24 in. 5 yd. 42 in.
3.	6 hr. 38 min. 1 hr. 42 min. 7 hr. 71 min.	3 pt. 12 fl. oz. 5 pt. 14 fl. oz. 8 pt. 26 fl. oz.	3 bu. 2 pk. 7 bu. 2 pk. 11 bu. 4 pk.

4. From 3 gal. take 1 gal. 3 qt.

3 gal. = 2 gal. 4 qt.
−1 gal. 3 qt. = 1 gal. 3 qt.
1 gal. 1 qt.

Subtract in the following:

	a	b
5.	9 ft. 10 in. 4 ft. 8 in. 5 ft. 2 in.	7 pt. 2 pt. 12 fl. oz. 5 pt. 0 fl. oz.
6.	8 lb. 6 oz. 5 lb. 12 oz. 3 lb. 6 oz.	32 min. 10 sec. 15 min. 35 sec. 17 min. 15 sec.
7.	4 hr. 2 hr. 26 min. 2 hr. 26 min.	7 gal. 1 qt. 5 gal. 2 qt. 1 gal. 3 qt.

8. A can contained 1 qt. 14 fl. oz. of fruit juice. A pint of the juice was used. How many fluid ounces remained?

8. 16 fl. oz.

9. A ham weighing 14 lb. 6 oz. was cut into two pieces. One of the pieces weighed $8\frac{1}{2}$ pounds. What was the weight of the other piece?

9. 14 lb.

Kinds of Examples in Multiplication of Fractions (29)

There are three types of examples in multiplication of fractions.
Find the products:

I. Multiplying a fraction and a whole number

	a	b	c	d
1.	$3 \times \frac{3}{8} = 1\frac{1}{8}$ $\frac{3 \times 3}{8} = \frac{9}{8}$	$4 \times \frac{5}{6} = \frac{20}{6} = 3\frac{2}{6} = 3\frac{1}{3}$ $\frac{4 \times 5}{6} = \frac{20}{6}$	$2 \times \frac{7}{10} = 1\frac{4}{10} = 1\frac{2}{5}$	$3 \times \frac{5}{6} = 2\frac{3}{6} = 2\frac{1}{2}$ $\frac{3 \times 5}{6} = \frac{15}{6}$
2.	$\frac{3}{4} \times 8 = 6$	$\frac{5}{6} \times 4 = 3\frac{1}{2}$	$\frac{3}{4}$ of $36 = 6$	$\frac{7}{8}$ of $16 =$
3.	$16 \times \frac{5}{12} =$	$\frac{5}{6}$ of $30 = 5$	$9 \times \frac{4}{5} = 7\frac{1}{5}$	$\frac{4}{9}$ of $72 = 32$

II. Multiplying two or more fractions

	a	b	c
1.	$\frac{3}{4} \times \frac{5}{6} = \frac{3 \times 5}{4 \times 6} = \frac{15}{24} = \frac{5}{8}$	$\frac{3}{4} \times \frac{7}{8} = \frac{21}{32}$	$\frac{5}{6} \times \frac{9}{10} = \frac{45}{60}$
or	$\frac{\cancel{3}^{1}}{4} \times \frac{5}{\cancel{6}_{2}} = \frac{1 \times 5}{4 \times 2} = \frac{5}{8}$		
2.	$\frac{1}{2} \times \frac{11}{12} = \frac{1 \times 11}{1 \times 6} = \frac{11}{6} = 1\frac{5}{6}$	$\frac{2}{3} \times \frac{7}{10} = \frac{7}{15}$	$\frac{4}{5} \times \frac{15}{16} = \frac{15}{20} = \frac{3}{4}$
3.	$\frac{2}{3} \times \frac{3}{4} \times \frac{1}{2} = \frac{2 \times 3 \times 1}{3 \times 4 \times 2} = \frac{1}{4}$	$\frac{5}{6} \times \frac{3}{4} \times \frac{1}{2} = \frac{15}{26}$	$\frac{7}{8} \times \frac{3}{4} \times \frac{2}{3} = \frac{42}{96}$
or	$\frac{\cancel{2}^{1}}{\cancel{3}_{1}} \times \frac{\cancel{3}^{1}}{\cancel{4}_{2}} \times \frac{1}{\cancel{2}_{1}} = \frac{1 \times 1 \times 1}{1 \times 4 \times 1} = \frac{1}{4}$	$\frac{5}{\cancel{6}_{2}} \times \frac{\cancel{3}^{1}}{\cancel{4}_{2}} \times \frac{1}{\cancel{2}_{1}} = \frac{15}{16} = 1\frac{5}{16}$	$\frac{\cancel{7}^{1}}{\cancel{8}_{4}} \times \frac{\cancel{3}^{1}}{\cancel{4}_{2}} \times \frac{\cancel{2}^{1}}{\cancel{3}_{1}} = \frac{1}{8}$

III. Multiplying mixed numbers, or fractions and mixed numbers

	a	b	c
1.	$1\frac{1}{2} \times 2\frac{1}{4} = 3\frac{3}{8}$ $\frac{3}{2} \times \frac{9}{4} = \frac{27}{8} = 3\frac{3}{8}$	$2\frac{1}{2} \times 3\frac{1}{3} = 5\frac{5}{6}$ $\frac{5}{2} \times \frac{7}{3} = \frac{35}{6} = 5\frac{5}{6}$	$1\frac{1}{6} \times 3\frac{1}{7} = 4\frac{3}{42}$ $\frac{7}{6} \times \frac{28}{7} = \frac{196}{42}$
2.	$1\frac{1}{4} \times 4\frac{1}{2} = 5\frac{5}{8}$ $\frac{5}{4} \times \frac{9}{2} = \frac{45}{8} = 5\frac{5}{8}$	$7\frac{1}{3} \times 2\frac{1}{2} = 23$ $\frac{22}{3} \times \frac{5}{2} = \frac{115}{5} = 23$	$4\frac{1}{2} \times 6\frac{2}{3} = 38$ $\frac{9}{2} \times \frac{20}{3} = \frac{190}{5}$

I. Multiplication of Fractions and Mixed Numbers (29)

1. Find the cost of $5\frac{3}{4}$ pounds of meat at 76¢ a pound.

1. $4.37

$$\begin{array}{r} \$.76 \\ \times\ 5\frac{3}{4} \\ \hline 57\ \left(\frac{3}{4} \times 76\right) \\ +\ 380\ (5 \times 76) \\ \hline \$4.37 \end{array}$$

Find the products:

	a	b	c	d
2.	$84 \times 2\frac{3}{4}$ of 84 = 168 + 21 = 189	$72 \times 6\frac{2}{3}$ ⅔ of 72 = 144 + 24 = 168	$\$1.26 \times 4\frac{1}{2}$ 1.26 = 5.04 + 63 = $5.67	$\$2.36 \times 7\frac{3}{4}$ 2.36 = 16.52 + 1.77 = $18.29
3.	$87\frac{1}{2} \times 3$ $1\frac{1}{2}\ (3 \times \frac{1}{2})$ 261 (3 × 87) = 262½	$36\frac{3}{4} \times 8$ ¾ of 8 = 6 288 + 2 = 290	$112\frac{1}{2} \times 9$ ½ of 9 = 4½ 1008 + 4½ = 1012½	$129\frac{3}{4} \times 6$ ¾ of 6 = 4½ 774 + 1½ = 775½

II. Approximating the Product (29)

Round off the fractions in the following examples to either $\frac{1}{2}$ or 1. If the value of a fraction is nearer to $\frac{1}{2}$ than 1, think of the fraction as $\frac{1}{2}$. If the value is nearer to 1 than to $\frac{1}{2}$, think of the fraction as 1.

1. Find the approximate product of $6 \times \frac{3}{8}$.

Think of $\frac{3}{8}$ as $\frac{1}{2}$; $6 \times \frac{1}{2} = 3$, the approximate product.

On the blanks write the approximate products.

	a	b	c	d
2.	$5 \times \frac{7}{8}$; 4⅜	$10 \times \frac{2}{3}$; 10	$\frac{5}{8} \times 4$; 4 10/30	$9 \times \frac{7}{16}$; 9 16/30
3.	$3 \times \frac{5}{6}$; 2½	$15 \times \frac{2}{5}$; 3/15	$\frac{7}{12} \times 16$; 16 7/12	$\frac{9}{10} \times 8$; 8 10/19
4.	$1\frac{2}{3} \times 12$; 18	$4 \times 6\frac{3}{8}$; 3/24	$10 \times 4\frac{2}{3}$; 10 3/4	$2\frac{5}{8} \times 9$; 3 5/8
5.	$\frac{8}{9} \times 5$; 4/9	$\frac{11}{12} \times 8$; 8 11/30	$4\frac{1}{6} \times 5$; 4 5/6	$2\frac{7}{12} \times 8$; 1/12

Important Points in Division of Fractions (34)

I. Checking the size of the quotient.

Before each of the three statements which follow, write the letter of the example shown on the right which proves that the statement is true.

A. $12 \div 4 = 3$
B. $12 \div 12 = 1$
C. $4 \div 12 = \frac{1}{3}$

1. I — **1.** When a number is divided by itself, the quotient is 1.

2. F — **2.** When a number is divided by a larger number, the quotient is less than 1.

3. F — **3.** When a number is divided by a smaller number, the quotient is more than 1.

4. Mark with **X** the examples in which the quotient will be less than 1; mark with **Y** the examples in which the quotient will be greater than 1.

Y **a.** $15 \div 3$ Y **b.** $10 \div 15$ X **c.** $\frac{1}{3} \div \frac{1}{4}$ Y **d.** $\frac{1}{3} \div 6$

II. Dividing a whole number by a fraction.

1. 24 — **1.** How many $\frac{3}{8}$-inch lengths are there in 3 inches?

2. 24 — **2.** How much is $3 \div \frac{3}{8}$?

3. 8 — **3.** Dividing by $\frac{3}{8}$ is the same as multiplying by what number?

To divide a whole number by a fraction, invert the fraction and multiply.

Find the quotients of the following examples:

	a	b	c	d
4.	$2 \div \frac{2}{3} = \frac{6}{3} \div \frac{2}{3} = \frac{3}{1} = 3$	$4 \div \frac{2}{5} = \frac{10}{5} \div \frac{2}{5} = \frac{5}{1} = 5$	$6 \div \frac{3}{4} = \frac{24}{4} = \frac{3}{4} = \frac{8}{1} = 8$	$12 \div \frac{2}{3} = \frac{36}{3} \div \frac{2}{3}$ $\frac{18}{3} 6$
	$2 \times \frac{3}{2} =$			
5.	$10 \div \frac{5}{6} =$ $10 \div \frac{6}{5} = \frac{50}{5} \div \frac{6}{5} = 8$	$9 \div \frac{3}{8} = 27$	$4 \div \frac{3}{5} = 12$	$8 \div \frac{3}{4} = 24$
6.	$5 \div \frac{1}{4} = 5$	$16 \div \frac{2}{5} = 10$	$12 \div \frac{1}{8} = 12$	$12 \div \frac{5}{8} = 20$

III. Dividing a fraction by a fraction.

1. Divide $\frac{3}{4}$ by $\frac{1}{2}$. 1. $\frac{3}{8}$

2. Dividing by $\frac{1}{2}$ is the same as multiplying by what number? 2. 4

To divide by a fraction, invert the divisor and multiply.

3. In example 1, $\frac{3}{4}$ is the number divided and $\frac{1}{2}$ is the divisor. The number divided is greater than the divisor. The quotient must be greater than what whole number? 3. 1

4. Write the letters of the examples in which the answer will be greater than 1. Now divide to check your selections.

a. $\frac{1}{2} \div \frac{5}{6}$ b. $\frac{3}{4} \div \frac{3}{8}$ c. $\frac{1}{4} \div \frac{1}{3}$ d. $\frac{5}{6} \div \frac{2}{3}$ 4. b, c

Find the quotients of the following:

	a	b	c	d
5.	$\frac{2}{3} \div \frac{1}{2} = \frac{3}{6} = \frac{1}{2}$	$\frac{4}{5} \div \frac{3}{10} = \frac{15}{50}$	$\frac{1}{6} \div \frac{1}{3} = \frac{6}{18} = \frac{1}{3}$	$\frac{1}{2} \div \frac{3}{8} = \frac{6}{16}$ 1
6.	$\frac{1}{2} \div \frac{7}{8} =$	$\frac{9}{10} \div \frac{4}{5} =$	$\frac{2}{3} \div \frac{3}{4} =$	$\frac{3}{4} \div \frac{2}{3} =$

IV. Dividing a fraction by a whole number.

1. Divide $\frac{3}{4}$ by 2. $\frac{3}{4} \div 2 = \frac{3}{4} \times \frac{1}{2} =$ 1. $\frac{3}{8}$

2. Dividing by 2 is the same as multiplying by what number? 2. $\frac{1}{2}$

Find the quotients of the following:

3.	$\frac{5}{6} \div 3 = 15$	$\frac{4}{5} \div 2 = 8$	$\frac{7}{8} \div 3 = 21$	$\frac{1}{2} \div 4 = 4$
4.	$\frac{3}{8} \div 6 = 18$	$\frac{9}{10} \div 6 = 54$	$\frac{5}{6} \div 5 = 25$	$\frac{1}{3} \div 3 = 3$

I. Steps in Division of Fractions (35)

Divide in the following examples. All of the examples in each row are of the same type.

	a	b	c	d
1.	$6 \div \frac{1}{3} = \frac{2}{1} = 2$	$9 \div \frac{3}{4} = 12$	$12 \div \frac{3}{8} = 22$	$36 \div \frac{4}{9} = 58$
2.	$7 \div \frac{2}{3} = 3\frac{1}{2}$	$10 \div \frac{4}{5} = 40$	$12 \div \frac{8}{9} = 86$	$1 \div \frac{3}{8} = 3$
3.	$6 \div 1\frac{1}{2} =$	$8 \div 2\frac{1}{4} =$	$10 \div 4\frac{2}{3} = 40$	$8 \div 4\frac{1}{2} = 8$
4.	$\frac{3}{4} \div \frac{3}{8} = \frac{6}{24}$	$\frac{3}{7} \div \frac{4}{5} =$	$\frac{1}{2} \div \frac{4}{9} = \frac{24}{9}$	$\frac{5}{9} \div \frac{5}{6} = \frac{2}{4}$
5.	$2\frac{1}{2} \div 1\frac{1}{4} = \frac{5}{2}$	$5\frac{1}{2} \div 2\frac{1}{3} = 2\frac{2}{3}$	$1\frac{7}{8} \div 3\frac{1}{3} = 47\frac{7}{8}$	$4\frac{1}{2} \div 1\frac{1}{2} = 4\frac{1}{4}$
6.	$\frac{1}{2} \div 4 = 8$	$\frac{9}{10} \div 3 = \frac{3}{9}$	$\frac{5}{8} \div 10 = 95$	$\frac{7}{8} \div 2 = \frac{2}{4}$
7.	$1\frac{1}{4} \div 5 = 9$	$8\frac{1}{4} \div 2 = 8\frac{2}{5}$	$12\frac{1}{3} \div 6 = 6\frac{1}{3}$	$3\frac{1}{2} \div 2 = 3\frac{2}{3}$

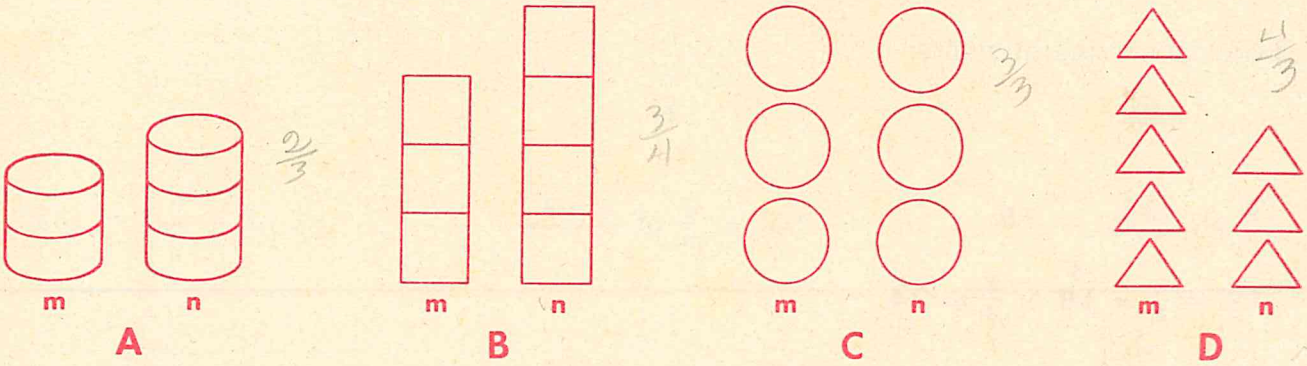
II. Number Quickies (35)

1. 15 **1.** The product of two numbers is zero. If one of the numbers is 15, what is the other number?

2. 11 **2.** The product of two numbers is 1. If one of the numbers is 12, what is the other number?

3. $\frac{2}{3}$ **3.** The quotient of two numbers is 1. If one of the numbers is $\frac{2}{3}$, what is the other number?

Finding the Ratio of Two Amounts (36)



See diagram **A**. The fraction $\frac{2}{3}$ shows the ratio of the number of disks in **m** compared to the number in **n**.

1. Use diagram **B**. What is the ratio of the number of squares in **m** to the number in **n**? 1. 3/4

2. In which diagram is the ratio of the two amounts equal to 1? 2. C

3. Use diagram **D**. What is the ratio of the numbers in **m** to **n**? 3. 5/3 = 1 2/3

4. In diagram **D**, what is the ratio of the numbers in **n** to **m**? 4. 3/5

5. If the ratio of **m** to **n** is $\frac{5}{6}$, what is the ratio of **n** to **m**? 5. 6/5 = 1 1/5

Find the ratio of **x** to **y** in the following:

	x	y	Ratio
6.	1¢	5¢	6. 1/5
7.	10¢	25¢	7. 10/25
8.	6 in.	1 ft.	8. 6 in. / 12 ft.
9.	4 oz.	1 lb.	9. 4 oz. / 16
10.	1 lb.	14 oz.	10. 16 / 14 oz.
11.	1 pt.	1 gal.	11. 1 pt / 8 pt.
12.	1 pt.	8 fl. oz.	12. 1 pt / 8 fl oz.
13.	50¢	$2	13. 50¢ / $2.00

	x	y	Ratio
14.	1 pk.	1 bu.	14. 1 pk. / 4 pk.
15.	10 sec.	1 min.	15. 10 sec / 60 sec.
16.	1 min.	20 sec.	16. 60 / 20
17.	1 mi.	½ mi.	17. 1 mi / ½ mi
18.	20 hr.	1 da.	18. 20 hr. / 24
19.	7 da.	1 wk.	19. 7 da. / 7 da.
20.	6 mo.	1 yr.	20. 6 mo. / 12 mo.
21.	40 min.	1 hr.	21. 40 min / 60

22. A recipe calls for 2 pounds of sugar to 3 pounds of berries. How many pounds of sugar are needed for 6 pounds of berries? 22. 2/3

23. The ratio of the length of a rectangle to its width is $\frac{8}{5}$. What is the length of the rectangle if the width is 10 feet? 23. 10 8/5

Finding a Number When a Fractional Part is Given (37)

Find the missing numbers:

	a	b	c
1.	$\frac{3}{4}$ of 24 = 18	140 = $\frac{4}{5}$ of 28	$\frac{7}{8}$ of 5 = 35
	$18 \div \frac{3}{4} = \overset{6}{\cancel{18}} \times \frac{4}{\cancel{3}_{1}} = 24$		
2.	$\frac{2}{3}$ of 48 = 96	80 = $\frac{5}{16}$ of 16	$\frac{9}{10}$ of 19 = 171
3.	$\frac{3}{4}$ of 28 = 84	57 = $\frac{3}{8}$ of 19	$\frac{4}{9}$ of 18 = 72
4.	$\frac{2}{5}$ of 17 = 35	50 = $\frac{4}{9}$ of 10	$\frac{3}{4}$ of 80 = 160
5.	$\frac{9}{10}$ of 3 = 60	240 = $\frac{5}{6}$ of 45	$\frac{5}{6}$ of 8 = 45

6. 120 **6.** A tank $\frac{3}{5}$ full contains 360 gallons. How many gallons will the tank hold when filled?

7. 44¢ **7.** The cost of $\frac{3}{4}$ pound of salted nuts is $1.35. At that rate, what is the cost a pound?

8. 165 **8.** The cost of a steak weighing $2\frac{3}{4}$ pounds was $3.30. What was the average cost a pound?

9. $13000 **9.** The cost of constructing a road $\frac{3}{10}$ mile long was $57,000. At that rate, what would be the cost to construct a road a mile long?

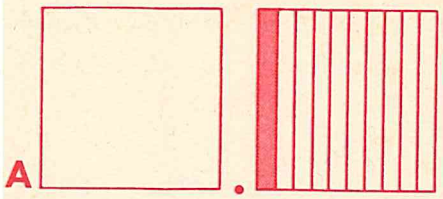
10. 20 **10.** What is the number if three eighths of it is equal to 150?

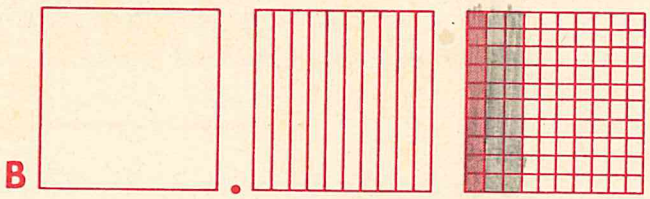
6.	7.	8.	9.	10.
$3\overline{)360}$ 120	$3\overline{)135}$ 44¢ 12 15	$2\overline{)3.30}$ 165	$3\overline{)15}$ 7 13	$3\overline{)150}$ 20

here =

Unit II. Decimal Fractions

Regrouping Decimals (45)



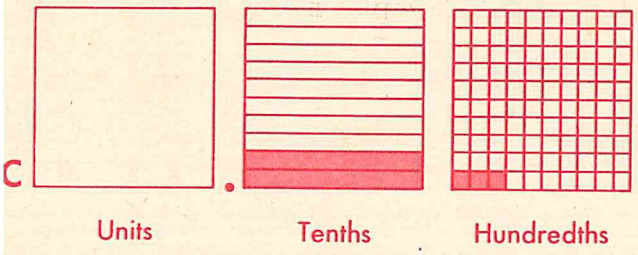


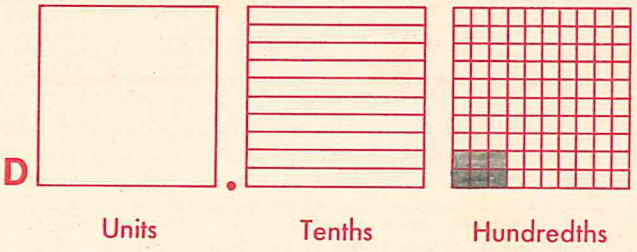
1. What number is shown in: a. diagram **A**? 1a. Tenths

b. diagram **B**? 1b. Hundredths

2. The two numbers shown above are equal. One tenth is equal to how many hundredths? 2. 10

3. Use diagram **B**. Shade enough of the squares in hundredths' place so that the part shaded will equal .3. How many squares are now shaded? 3. 30





4. Use diagram **C**.

a. How many strips are shaded in tenths' place? 4a. 2

b. How many squares are shaded in hundredths' place? 4b. 3

5. Use diagram **D**. Shade enough of the squares in hundredths' place to equal the number represented in **C**. How many squares did you shade? 5. 6

In the following, write on the blanks the number of:

a		b	
6. Hundredths in 3.1	310	Hundreds in 25,000	2,5
7. Hundredths in 1.25	1250	Thousands in 7500	7,500
8. Thousandths in 2	3,000	Millions in 3,500,000	35.000
9. Thousandths in .25	25,000	Hundreds in 400,000	40.000
10. Thousandths in .3	3,000	Millions in a billion	400,000

Comparing Decimals (46)

1. To rank the fractions $\frac{1}{2}$, $\frac{2}{3}$, $\frac{5}{8}$, and $\frac{7}{12}$, change the fractions to like fractions. These fractions are $\frac{12}{24}$, $\frac{16}{24}$, $\frac{15}{24}$, and $\frac{14}{24}$. Now arrange the fractions in order of value. Begin with the fraction having the least value.

$\frac{12}{24}$ $\frac{14}{24}$ $\frac{15}{24}$ $\frac{16}{24}$

2. To compare the decimals .3, .24, .275, and 1.1, express each as thousandths. These decimals are .300, .240, .275, and 1.100. Now arrange the decimals in order of their value. Begin with the decimal of least value.

.240 .275 .300 1.100

Arrange according to value. Begin with the number of least value.

	a					b				
3.	.1,	.09,	.75,	.012,	1	.45,	4.5,	.045,	5.4,	.54
	.1	.09	.012	.75	1	4.5	5.4	.045	.45	.54
4.	.7,	.77,	7.07,	7.7,	.707	.324,	.234,	2.34,	4.23,	3.24
	.7	.77	.77	.707	7.07	2.34	.234	.324	.324	4.23
5.	$\frac{3}{100}$,	.3,	$\frac{1}{2}$,	.65,	$\frac{9}{10}$	4.25,	.524,	2.45,	$4\frac{1}{2}$,	$2\frac{1}{2}$
	$\frac{3}{10}$	$\frac{9}{10}$	$\frac{1}{2}$	.3	.65	4.25	.524	2.45	$2\frac{1}{2}$	$4\frac{1}{2}$
6.	$\frac{7}{1000}$,	.77,	.9,	.07,	.71	.1,	1.01,	.01,	.91,	.19
	$\frac{7}{1000}$	.07	.9	.71	.77	1.01	.01	.1	.19	.91

7. The numbers below occur in a regular order. Some numbers are missing. Write the missing numbers on the blanks.

a.	.1	.2	.3	.4	.5	.6	.7	.8
b.	.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2
c.	1.2	1.6	2.0	2.4	2.8	3.2	3.4	4.0
d.	3.0	3.6	4.2	4.8	5.4	6.0	6.6	7.0

I. Rounding Off Decimals (47)

1. To the nearest hundredth (0.01), write the value of:

a. .736 ____ d. .0449 ____ g. .995 ____ j. .046 ____

b. .444 ____ e. .475 ____ h. 1.995 ____ k. .005 ____

c. .629 ____ f. .324 ____ i. 2.998 ____ l. .065 ____

2. To the nearest thousandth (0.001), write the value of:

a. .1256 ____ d. .9995 ____ g. 3.1416 ____

b. .0735 ____ e. .32449 ____ h. 1.9995 ____

c. .0842 ____ f. .32559 ____ i. 4.6868 ____

II. Number Quickies (47)

1. What is the number if $\frac{3}{4}$ of it is 12? 1. 4

2. The product of two numbers is 6. One of the numbers is 9. What is the other number? 2. 3

3. To the nearest cent, find the cost of 5 gallons of gasoline at 29.9¢ a gallon. 3. $14.94

4. What is the product of $7 \times 19 \times 0$? 4. 133

5. The cost of 100 tulip bulbs is $6.25. What is the average cost per bulb? 5. $\frac{1}{6}$ of a ¢

6. At a speed of 60 m.p.h., how many minutes does it take to travel 75 miles? 6. 2 hrs. 15 min.

7. The Stamp Club of a school meets on the third Monday of the month. What is: a. the earliest date of the month for the meeting? b. the latest date? 7a. 5 7b. 21

8. What is the largest two-place decimal which has a value less than 1? 8. 00

9. What fraction having a denominator of 16 has a value greater than $\frac{3}{4}$ but less than $\frac{7}{8}$? 9. 12

I. Addition and Subtraction of Decimals (49)

Add:

	a	b	c	d	e
1.	2.9 1.5 3.0 1.8 9.2	.7 5 .3 8 .4 0 .6 7 2.20	.4 7 .5 3 .0 8 .1 6 1.24	.0 5 .0 4 .0 7 .0 4 .20	.7 0 .4 0 .8 0 .5 0 2.40
2.	.9 .5 .4 .8 2.6	2.9 1.6 0.5 0.7 5.7	.4 2 3 .1 5 6 .2 0 0 .1 4 5 .924	.9 6 0 .7 3 0 .4 8 0 .5 3 0 2.700	5 9.1 3.8 2 7.6 1 4.0 104.3

Subtract:

3.	.4 0 .1 8 .22	.5 2 .4 8 .04	.7 0 .6 0 .10	4.6 3.5 1.1	7.2 6.8 .4
4.	5.4 3.4 2.0	.6 4 0 .3 2 0 32.0	.8 2 5 .6 5 8 .167	1.0 0 0.3 8 0.62	.7 2 5 .6 7 5 .50

II. Problems Dealing with Decimals (49)

1. 96 less inches

1. The rainfall in Big City was 4.12 inches in March and 3.26 inches in April. How much more rainfall was there in March than in April?

2. 6.2

2. The sum of four numbers is 28.5. Three of the numbers are 3.8, 8.7, and 9.8. What is the fourth number?

3. .0005

3. There can be an error of .0005 inch in the measurement of the diameter of a wheel. The true diameter is .775 inch. What is the least acceptable value of the diameter of the wheel?

4. .775

4. See problem **3**. What is the greatest acceptable value of the wheel's diameter?

1.	2.	3.	4.
4.12 3.26 .96	23.8 8.7 9.8 6.2 28.5	.0005	.775

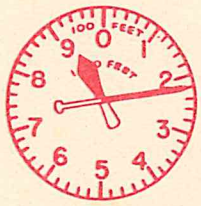
Reading a Dial (50)

A

B

C

D


E

1. What is the height represented on dial **A**?

1. 1000 ft

The short hand shows the altitude to be between 1000 ft. and 2000 ft.

2. Write the number represented by:

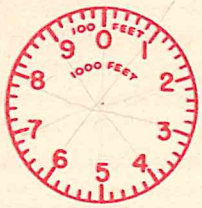
a. dial **B** — 2a. 8

b. dial **C** — 2b. 2/10

c. dial **D** — 2c. 1.4

d. dial **E** — 2d. 2.1

3. Use the diagrams below. Draw a short hand to represent thousands and a long hand to represent hundreds. Then draw these hands to represent the numbers given below each dial.


F

G

H

I

4200 ft. 1850 ft. 5180 ft. 7060 ft.

4. Write with figures:

a. 4.5 millions — 4,500,000

b. 3.25 billions — 3,250,000,000

c. 7.8 millions — 7,800,000

d. .9 billions — 900,000,000

5. Supply the missing numbers:

a. 3,500,000 = 3.5 millions

b. 7,800,000,000 = 7.8 billions

c. 800,000,000 = .8 billions

d. 2,500,000,000 = 2.5 millions

Multiplying a Decimal and a Whole Number (54)

1. 83.5

1. How far should the car shown travel while using 5 gallons of gasoline?

$$\begin{array}{r} 16.7 \\ \times\ 5 \\ \hline 83.5 \end{array}$$

Multiply as with whole numbers. The product of ones and tenths is tenths.

The product of a decimal and a whole number contains as many decimal places as in the decimal.

Find the products in the following:

	a	b	c	d	e
2.	4.6 × 7 = 32.2	.51 × 3 = 1.53	4.2 × 6 = 11.2	3.45 × 5 = 17.25	.675 × 8 = 5.4
3.	96 × .4 = 38.4	88 × .5 = 44.0	348 × .06 = 20.88	250 × .15 = 37.5	465 × .36 = 167.40
4.	80 × .7 = 56.0	120 × 1.2 = 144.0	7.65 × 4 = 30.60	3.48 × 20 = 69.6	730 × .9 = 657.0

5. 13

5. The length of a side of a square is 2.6 feet. What is the perimeter of the square?

6. 59.50

6. A farmer plants 1.7 bushels of wheat per acre. How many bushels are needed to plant 35 acres?

7. 34.0

7. The length of each side of a triangle is 8.5 inches. What is the perimeter of the triangle?

8. 41 R19

8. A nautical mile is equal to 1.15 land miles. A ship travels 24 nautical miles in an hour. How far does it travel in land miles?

5.	6.	7.	8.
2 | 12.6 → 13	31.70 × 35 = 850 + 510 = 39.50	8.5 × 4 = 34.0	24 | 115 → 96 → 19 → 4 R19

Multiplying Two Decimals (55)

1. A helicopter averages 67.5 miles an hour. How far should it travel in 1.5 hours?

1. 395

$$\begin{array}{r} 67.5 \\ \times\ 1.5 \\ \hline \end{array}$$

Multiply as with whole numbers.

The product of tenths and tenths is hundredths, or two decimal places.

To find the position of the point in the product:

(1) **Find the sum of the number of decimal places in the two numbers multiplied.**

(2) **From the right of the product, point off as many places as in (1).**

Find the products:

	a	b	c	d	e
2.	7.5 × .3 = 29.3	36 × .4 = 1.44	1.25 × 2.4 = 5.00, 25.0, 30.00	.78 × .6 = 4.68	.45 × 1.6 = 270, 45, 72.0
3.	.25 × .3 = .075	.45 × .03 = 1.25	.25 × .25 = 1.25, 50, 6.25	1.8 × 1.6 = 10.8, 18, 2.88	6.4 × .8 = 5.12
4.	1.25 × .5 = 6.25	7.8 × .02 = 1.56	3.5 × 2.4 = 140, 70, 84.0	7.5 × .01 = .75	4.9 × .9 = 44.1

5. Find the cost of 100 gallons of gasoline at 32.7¢ per gallon.

5. 3270

6. Water flows through a pipe at the rate of 4.5 gallons per minute. How many gallons will flow through in 3.6 minutes?

6. 17.28

7. A car averages 18.4 miles per gallon of gasoline. How far will the car travel while consuming 7.5 gallons of gasoline?

7. 138.20

8. To the nearest whole number, find the product of 8.5 and 22.7.

8. 312

5.	6.	7.	8.
32.7 × 100 = 32.700	4.5 × 3.6 = 270, 135, 16.20		22.7 × 18.5 = 3.12

Multiplying by 10, 100, or 1000 (57)

The Navy estimates that the yearly consumption of coffee per man is as follows:

Ashore in this country . . . . . 18.98 lb.
Ashore outside of this country . . . . . 26.28 lb.
Aboard ship at sea . . . . . 32.49 lb.

1. $1898.00 **1.** How many pounds of coffee would be used in a year by 100 men in the Navy on shore duty in this country?

2a. 1898 **2.** Find the yearly number of pounds of coffee for a crew of 100 men

2b. 3249 in the Navy: **a.** ashore outside of this country; **b.** aboard ship at sea.

3a. $ 169.00 **3.** The average yearly consumption of coffee per person in this country is 16.9 pounds. On the average, how much coffee is consumed yearly by:

3b. $ 69.0000 **a.** 100 people? **b.** 1000 people?

Write the products of the following:

	a	b	c
4.	$10 \times 78 =$ 780	$100 \times 36 =$ 300	$100 \times 4.2 =$ 420.00
5.	$100 \times 1.04 =$ 10.100	$1000 \times .8 =$ 8,000	$1000 \times 1.2 =$ 1.2000
6.	$1000 \times 2.5 =$ 2.500	$100 \times .67 =$ 67	$1000 \times .075 =$ 75.000
7.	$10 \times 3.75 =$ 3.750	$100 \times .945 =$ 94.5	$1000 \times .01 =$ 1.000

Since $10 \times 7.5 = 75$, to change 7.5 to 75 it is necessary to multiply 7.5 by 10.

Write the missing numbers on the blanks:

	a	b	c
8.	30 $\times$ 3.8 = 38	5 $\times$ .56 = 56	$10 \times$ 45 = 45
9.	20 $\times$ .025 = 25	2 $\times$ 9.2 = 92	$100 \times$ 25 = 125
10.	65 $\times$ .567 = 567	4 $\times$ .004 = 4	$1000 \times$ 40 = 48
11.	12 $\times$ .012 = 12	09 $\times$ .09 = 9	$100 \times$ 36 = 136
12.	10 $\times$ .001 = 1	25 $\times$ 3.25 = 325	$10 \times$ 13 = 132

I. Step by Step in Multiplication of Decimals (63)

The following exercise contains all of the types of examples in multiplication of decimals.

Find the products:

	a	b	c	d	e
1.	7.6 × 3 = 22.8	3.6 × 6 = 21.6	4.75 × 8 = 38.00	.765 × 8 = 6.320	.048 × 7 = .336
2.	.54 × .3 = .162	3.9 × 1.4 = 1.56 + .39 = 5.46	.56 × .08 = .0448	4.60 × .05 = .2300	.225 × .06 = .0135
3.	3.2 × 1.6 = 1.92 + 1.32 = 3.12	3.6 × .6 = 2.16	4.05 × .36 = 2.430 + 1.215 = 3.6450	37.2 × 2.5 = 18.60 + 7.44 = 93.00	8.25 × .6 = 4.950
4.	.18 × .2 = .036	.25 × .3 = .075	.46 × .12 = .92 + .46 = .0552	.15 × .15 = .75 + .15 = .0225	.75 × .06 = .0450
5.	9.6 × 10 = 9.6	8.35 × 10 = 8.35	.738 × 100 = .7380	4.36 × 100 = 436.00	8.675 × 1000 = 8675.000

II. Placing the Decimal Point in the Product (63)

Insert the decimal points so as to give the correct products.

	a	b	c
1.	12 × 1.2 = 1 4 4	.9 × 1.5 = 1 3 5	100 × 3.75 = 3 7 5 0 0
2.	.3 × 1.3 = 3 9	.24 × 24 = 5 7 6	36 × .6 = 2 1 6
3.	.21 × 1.9 = 3 9 9	5.2 × 4.8 = 2 4 9 6	10 × 3.14 = 3 1 4 0
4.	.16 × 1.5 = 2 4 0	3.6 × .36 = 1 2 9 6	.11 × .11 = 1 2 1
5.	.07 × 4.2 = 2 9 4	1000 × .01 = 1 0 0 0	.14 × 14 = 1 9 6

Dividing a Decimal by a Whole Number (66)

Find the quotients:

	a	b	c	d	e
1.	.6 2)1.2	2.1 4)8.4	.27 3).81	15 5)75	.8 12)9.6
2.	1.9 3)5.7	13 7).91 7 21	3.3 4)13.2	2.6 6)15.6	.44 9)4.23
3.	.07 2).14	.07 3).21	.09 8).72	1 9).162	.36 7).252 21 42
4.	.58 3).174 15 24	.25 5).125 10 25	.59 4).236 20 36	.88 6).528 48 48	.13 8).104 8 24

5. Divide .4 by 5.

$5\overline{).4} = 5\overline{).40}$ .08

Regroup 4 tenths as 40 hundredths.
40 hundredths ÷ 5 = 8 hundredths, or .08.

6.	45 4)1.80 16 20	184 5)9.20 5 4.2 40 20	825 8)6.6600 64 20 16 40	185 2)3.70 2 17 16 10 10	1925 4)7.7000 4 3.7 36 20 20
7.	.75 2)1.50 14 10	8)4.6 5 8|4600 40 60	12).42	20)8.40 80 40	25)9.5 75 20
8.	39 2)7.8 6 18	4).060	.26 5).130 10 30	.95 8)7.60 72 40	.18 3).54 3 24
9.	192 5)9.60 5 46 45 10	1.20 8)10.20 8 20 16 40	.05 4).020	224 16)3.60 32 40 32 80	.3 25).80 0

Dividing Two Whole Numbers with a Decimal in the Quotient (68)

Find the decimal value of the following:

	a	b	c	d
1.	$\frac{3}{4}$ = .75	$\frac{3}{40}$ = .075	$\frac{7}{8}$ = .875	$\frac{5}{8}$ = .625
2.	$\frac{1}{5}$ = .20	$\frac{7}{20}$ = .35	$\frac{9}{25}$ = .36	$\frac{1}{2}$ = .5
3.	$\frac{11}{20}$ = .55	$\frac{4}{25}$ = .16	$\frac{17}{50}$ = .34	$\frac{9}{10}$ = .9

4. Find the decimal value of $\frac{1}{3}$.

$.3\ 3\ \frac{1}{3}$

$\frac{1}{3} = 3\overline{)1.0\ 0}$

The exact decimal value of $\frac{1}{3}$ can never be found. Express the quotient as a two-place decimal and write the remainder as shown.

5.	$\frac{1}{6}$ = .16 R 4	$\frac{7}{12}$ = .58 $\frac{1}{4}$	$\frac{4}{15}$ = .26 $\frac{10}{15}$	$\frac{5}{6}$ = .83 $\frac{1}{3}$
6.	$\frac{11}{30}$ = .36 $\frac{20}{30}$	$\frac{3}{7}$ = .42 R 6	$\frac{5}{9}$ = .5 R 5	$\frac{11}{12}$ = .91 $\frac{8}{12}$

7. Find the following batting averages:

	Hits	At Bat	
a.	5	12	$\frac{5}{12} = 12\overline{)5.0000}$
b.	4	15	
c.	18	55	
d.	136	425	

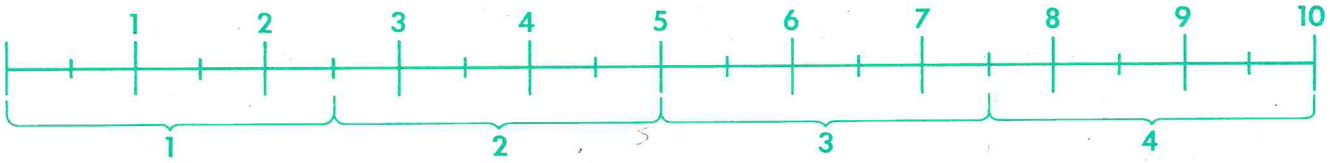
7a. _____

7b. _____

7c. _____

7d. _____

Dividing a Whole Number by a Decimal (69)



1. An airplane travels an average of 2.5 miles per minute. At that rate, how long will it take to travel 10 miles?

1a. 5 hr

a. From the diagram, how many minutes will it take?

1b. _____

b. Find the answer by division of decimals.

Find the quotients:

	a	b	c	d
2.	$.6\overline{)12} = 6\overline{)120}$ (20)	$.5\overline{)40}$ (8)	$.3\overline{)15}$ (5)	$.4\overline{)26.0}$ (6.5)
3.	$.8\overline{)10.00}$ (12.5)	$.7\overline{)21}$ (3)	$.5\overline{)8.0}$ (16)	$.2\overline{)9.0}$ (45)
4.	$1.2\overline{)9.00}$ (7.5)	$1.5\overline{)6.0}$ (4)	$2.5\overline{)7.00}$ (2.8)	$.05\overline{)6.0}$ (120)
5.	$1.8\overline{)54}$ (30)	$2.4\overline{)120}$ (50)	$.36\overline{)9.00}$ (25)	$.25\overline{)4.00}$ (16)

6. 80

6. How many strips of ribbon 1.5 yards long can be cut from a piece of ribbon 18 yards long?

7. 8

7. What number divided by .4 has a quotient of 8?

8. 3

8. A manufacturer of cars manufactures, on the average, a car every .2 minutes. At that rate, how many cars are manufactured in an hour?

6. $1.5\overline{)120}$ (80), 144, 6

7. $5\overline{)1.40}$ (8)

8. $.20\overline{)12.00}$ (3)

Dividing a Decimal by a Decimal (70)

To divide by a decimal, make the divisor a whole number by multiplying by 10, 100, or 1000 as needed. Then multiply the dividend by the same number. Note the method in example **1a**.

Find the quotients of the following:

	a	b	c	d
1.	$1.5\overline{)7.5} = \frac{7.5}{1.5}$; $\frac{10 \times 7.5}{10 \times 1.5} = \frac{75}{15}$; $15\overline{)75}$	$.4\overline{).3}$	$.8\overline{)1.2}$	$.6\overline{)4.5}$
2.	$.9\overline{)1.26}$	$1.4\overline{).98}$	$1.2\overline{).9}$	$.05\overline{)1.3}$
3.	$.25\overline{)1.1}$	$.02\overline{)1.5}$	$.36\overline{)14.4}$	$2.5\overline{)5.8}$
4.	$.16\overline{)4.80}$	$1.6\overline{).720}$	$.35\overline{).70}$	$.11\overline{).121}$
5.	$2.4\overline{)1.68}$	$.9\overline{).072}$	$7.5\overline{)1.20}$	$2.5\overline{)4.60}$

6. How many boards 1.5 feet long can be cut from a board 10.5 feet long? 6. 7 ft.

Types of Examples in Division of Decimals (71)

Find the quotients:

Type I

	a	b	c	d	e
1.	$3\overline{)7.5}$	$4\overline{).6\,0}$	$8\overline{).3\,6\,0}$	$5\overline{)1.4\,0}$	$2\overline{).0\,1\,0}$
2.	$7\overline{)9.8}$	$9\overline{)1.3\,5}$	$4\overline{)6.6\,0}$	$3\overline{).8\,4}$	$6\overline{)1.1\,4}$

Type II

	a	b	c	d	e
1.	$4\overline{)3.00}$	$6\overline{)9.0}$	$12\overline{)9.00}$	$28\overline{)7\,0\,0}$	$36\overline{)2\,7}$
2.	$25\overline{)7\,0\,0}$	$20\overline{)1\,1\,0}$	$50\overline{)3\,7\,0\,0}$	$12\overline{)1\,8\,0}$	$25\overline{)3\,4\,0\,0}$

Type III

	a	b	c	d	e
1.	$.3\overline{)8\,1}$	$.4\overline{)9}$	$.8\overline{)3}$	$2.5\overline{)6}$	$.5\overline{)1}$
2.	$1.2\overline{)1\,8}$	$3.6\overline{)1\,4\,4}$	$7.5\overline{)6}$	$.15\overline{)3}$	$.25\overline{)3}$

Type IV

	a	b	c	d	e
1.	$.8\overline{)4.6}$	$.4\overline{)9.5}$	$.05\overline{).1\,0}$	$1.6\overline{).8\,0}$	$2.5\overline{).9\,0}$
2.	$2.6\overline{).1\,3\,0}$	$1.6\overline{)1\,4.4}$	$7.2\overline{)5\,7.6}$	$.04\overline{)1.3\,0}$	$1.2\overline{).7\,5\,0}$

I. Inserting the Point in the Answer (72)

Insert the decimal points to make the answers correct. Annex zeros when necessary.

	a			b		
1.	$6 \div .3$	=	2	$.12 \div 4$	=	.3
2.	$.752 \div 16$	=	4.7	40×3.2	=	128 0
3.	1.5×1.5	=	2.25	$.3 \times .12$	=	3.6
4.	$87 \div 8.7$	=	1	$95.7 \div 2.9$	=	33
5.	$2511 \div 2.7$	=	93	$3.1 \times .29$	=	89.9
6.	$.05 \times 1.7$	=	85	$1.6 \times .16$	=	25.6
7.	$.75 \div 15$	=	.5	$.361 \div 1.9$	=	19
8.	$.0324 \div .18$	=	1.8	$10 \div .1$	=	1.0
9.	100×7.5	=	750 0	$9.6 \div .6$	=	1.6
10.	$1.2 \times .12$	=	144	$9 \div .3$	=	.3

II. Rounding Off the Quotient (72)

1. To the nearest hundredth, what is the value of $\frac{3}{7}$? 1. _____

   To three decimal places, the value of $\frac{3}{7}$ is .428.

To the nearest hundredth, find the value of:

	a	b	c	d
2.	$\frac{2}{7}$ =	$\frac{3}{11}$ =	$\frac{6}{7}$ =	$\frac{4}{15}$ =
3.	$\frac{7}{9}$ =	$\frac{5}{16}$ =	$\frac{8}{11}$ =	$\frac{5}{6}$ =

The Metric and English Systems of Linear Measures (78)

Metric System			English System		
10 millimeters (mm.)	=	1 centimeter (cm.)	12 inches (in.)	=	1 foot (ft.)
100 centimeters	=	1 meter (m.)	3 feet	=	1 yard (yd.)
1000 meters	=	1 kilometer (km.)	5280 feet	=	1 mile (mi.)

1. 10 **1.** How many centimeters are there in a kilometer?

2. 10 **2.** To change millimeters to centimeters, divide by what number?

3. (**3.** To change meters to kilometers, divide by what number?

4.) **4.** To change centimeters to meters, divide by what number?

5. _____ **5.** To change kilometers to meters, multiply by what number?

6. 1 **6.** How many inches are there in a yard?

7. _____ **7.** How many inches are there in a mile?

8. _____ **8.** How many yards are there in a mile?

9. 3 **9.** To change inches to yards, divide by what number?

10. _____ **10.** To change feet to miles, divide by what number?

11. _____ **11.** There are $5\frac{1}{2}$ yards in a rod. How many feet are there in a rod?

Find the missing numbers:

	a		b		c	
12.	6 m. = 6 cm.		200 mm. = 20 cm.		660 ft. = _____ mi.	
13.	1500 m. = 1 km.		3.5 km. = 3 m.		4.5 ft. = _____ in.	
14.	300 cm. = 3 m.		8.5 m. = 9 cm.		204 in. = _____ ft.	
15.	750 mm. = 5 cm.		4.2 m. = _____ cm.		440 yd. = 2 mi.	
16.	4.65 km. = 6 m.		800 m. = 8 km.		1.5 yd. = 5 in.	
17.	90 mm. = 9 cm.		3.7 cm. = 700 mm.		$\frac{1}{4}$ mi. = 440 yd.	

✓ here

Approximate Equivalents of Different Measures (79)

1. If 5 centimeters equal approximately 2 inches, 1 inch is equal approximately to how many centimeters? 1. _____

2. Allowing 2.5 centimeters per inch, 1 foot is equal to how many centimeters? 2. _____

3. See problem 2. One yard is equal to how many centimeters? 3. _____

4. Which of the following track races is nearest to a mile? 4. _____

a. 1,000 meters b. 1,500 meters c. 2,000 meters

5. The 400 meter track race is equal to what fractional part of a mile? 5. _____

6. Two cities are 800 miles apart. What is the distance in kilometers between the two cities? 6. _____

4.	5.	6.

7. The distance between two places is 120 kilometers. What is the approximate distance in miles between the two places? 7. _____

8. Express a speed of 60 m.p.h. as kilometers per hour. 8. _____

9. The speed of sound at sea level is approximately 750 m.p.h. Express this speed as kilometers per hour. 9. _____

7.	8.	9.

Find the approximate equivalents of:

	a	b
10.	40 m.p.h. = _____ km.p.h.	120 km.p.h. = _____ m.p.h.
11.	500 m.p.h. = _____ km.p.h.	400 km.p.h. = _____ m.p.h.
12.	360 mi. = _____ km.	640 km.p.h. = _____ m.p.h.

Practicing the Fundamentals (81)

a	b	c	d	e

1. Add:

a	b	c	d	e
4 7 5 6 8 9 7 7 4 3 8 6 8 5	3.1 5.8 6.2 8.7	$\frac{7}{8}$ $\frac{3}{4}$ $\frac{1}{2}$	$9\frac{2}{3}$ $8\frac{1}{2}$ $4\frac{5}{6}$	3 min. 12 sec. 5 min. 45 sec. 55 sec.

2. Subtract:

a	b	c	d	e
3 0,0 2 5 2 0,0 8 7	.3 2 5 .1 7 5	28 $17\frac{3}{8}$	$7\frac{1}{2}$ $5\frac{2}{3}$	5 ft. 4 in. 3 ft. 9 in.

3. Multiply:

a	b	c	d	e
4 0 9 3 7	5 6 $7\frac{3}{4}$	5.2 .8	$\frac{7}{8} \times 3\frac{1}{2} =$	$\frac{5}{6} \times 1\frac{1}{3} \times 3\frac{3}{4} =$

4. Divide:

a	b	c	d	e
$365\overline{)2\,0{,}6\,3\,0}$	$1.2\overline{)1.5}$	$.4\overline{)7\,5}$	$60 \div \frac{3}{4} =$	$1\frac{1}{2} \div \frac{3}{8} =$

5. Find the value of:

a. Multiply 5 lb. 8 oz. by 3.

b. Divide 4 pt. 14 fl. oz. by 3.

Reviewing Decimals (82)

1. How many tenths are there in 3.7? 1. _____

2. Write with figures 3.4 millions. 2. _____

3. The sum of two numbers is 1.3. One of the numbers is .9. What is the other number? 3. _____

4. Two numbers differ by 2.6. The smaller number is 5.7. What is the larger number? 4. _____

5. The product of two numbers is 24. One of the numbers is .8. What is the other number? 5. _____

6. If a number is divided by 1.5, the quotient is 3.8. What is the number? 6. _____

7. An airplane has a speed of 300 m.p.h. Assume .6 mile equal to one kilometer. Express the speed of the airplane as kilometers per hour. 7. _____

8. To the nearest hundredth, what is the value of $\frac{6}{7}$? 8. _____

3.	4.	5.	6.	7.	8.

Write the missing numbers:

	a	b	c
9.	$10 \times 7.8 =$ ___	$100 \times 3.6 =$ ___	$1000 \times .48 =$ ___
10.	$6.7 \div 100 =$ ___	$3.45 \div 10 =$ ___	$6.25 \div 100 =$ ___
11.	250 cm. = ___m.	1.4 m. = ___cm.	480 mm. = ___cm.
12.	4560 mm. = ___m.	.85 m. = ___mm.	1.82 km. = ___m.
13.	2.1 = ___hundredths	1.45 = ___tenths	54 tenths = ___hundredths
14.	75,000 = ___thousands	15,000 = ___hundreds	7800 = ___tens

Test on Unit II

1.

a	b	c	d	e
7.4 3.8 9.8	.3 2 5 − .2 7 5	3.8 × .6	$1.5\overline{)9}$	$2.5\overline{).4}$

2. _____ **2.** How many tenths are there in 2.8?

3. _____ **3.** How many centimeters are there in 7.6 meters?

4. _____ **4.** Use figures to write 3.45 billion dollars.

5. _____ **5.** Express the fraction $\frac{3}{8}$ as a decimal.

6. _____ **6.** A car travels an average of 16.7 miles per gallon of gasoline. To the nearest tenth of a mile, how far should the car travel while using 7.5 gallons of gasoline?

7. _____ **7.** A batter got 9 hits out of 28 times at bat. Express his batting average as a three-place decimal.

8. _____ **8.** Gasoline sells at 31.7¢ a gallon. To the nearest cent, find the cost of 15 gallons of gasoline.

6.	7.	8.

9. _____ **9.** The average monthly rainfall in a city is 3.27 inches. What is the total yearly rainfall?

10. _____ **10.** A package of flour contains 7.5 pounds. How many of such packages can be filled with 150 pounds of flour?

11. _____ **11.** Assume a kilometer to equal $\frac{5}{8}$ mile. Express a speed of 45 m.p.h. as kilometers per hour.

9.	10.	11.

Unit III. Per Cent

The Meaning of Per Cent (88)

1. Write each of the following in three other ways:

a. 3 out of 100 3% .03 $\frac{3}{100}$

b. 77 out of 100 77% .07 $\frac{7}{100}$

c. 27 out of 100 27% .027 $\frac{27}{100}$

d. 9% 9 out of 100 $\frac{9}{100}$ .09

e. $\frac{11}{100}$ 11 out of 100 11% .011

f. .01 1 out of 100 1% $\frac{1}{100}$

g. 21% 21 out of 100 .21 $\frac{21}{100}$

h. $\frac{7}{100}$ 7 out of 100 .07 7%

i. .15 15 out of 100 15% $\frac{15}{100}$

j. 35% 35 out of 100 35 $\frac{35}{100}$

2. If 10 of the disks were removed from a 100-board, what fractional part of the disks would be missing?

2. $\frac{1}{10}$

3. a. How many of the 100 disks should be removed so that one fourth of them would be missing?

3a. $\frac{1}{25}$

b. What per cent would be missing?

3b. 4%

4. If 50% of the 100 disks were missing, how many disks would be missing?

4. $\frac{1}{2}$

Find the missing numbers:

	a	b	c
5.	10% of 100 = 10	50% of 100 = $\frac{1}{2}$	15% of 100 =
6.	3% of 100 = 3	$\frac{1}{4}$ = 4 %	5 out of 100 = 5 %
7.	4 out of 100 = 4 %	$\frac{3}{4}$ = 4 %	70 out of 100 = 70 %
8.	$\frac{3}{10}$ = 3 %	1% = $\frac{1}{100}$	90 out of 100 = 90 %
9.	2% of 200 = 100	3% of 200 = 7	4% of 300 = 50
10.	10% of 500 = 50	8% of 200 = 2	5% of 400 = 80
11.	100% of 100 = 1	100% of 200 = 1	25% of 400 = 16
12.	1% of 200 = 1	50% of 200 = 2	100% of 500 = 5

I. Changing Per Cents to Decimals (89)

Write as decimals:

	a	b	c	d
1.	3% = .03	12% = .12	20% = .20	2.5% = .025
2.	45% = .45	$37\frac{1}{2}\%$ = .375	$7\frac{1}{2}\%$ = .075	6% = .06
3.	3.4% = .034	1.8% = .018	92% = .92	80% = .80
4.	$12\frac{1}{2}\%$ = .125	$3\frac{1}{4}\%$ = .0325	70% = .70	3.2% = .032
5.	35% = .35	73.1% = .731	9.5% = .095	15.5% =

II. Changing Decimals to Per Cents (90)

Write as per cents:

	a	b	c	d
1.	.3 = 30%	.16 = 16%	.03 = 3%	$.33\frac{1}{3}$ =
2.	.01 = 1%	.7 = 70%	.375 = 37.5%	.035 = 3.5%
3.	.038 = 3.8%	.96 = 96%	.014 = 1.4%	.125 = 12.5%
4.	.07 = 7%	.8 = 80%	.0375 = 3.75%	$.16\frac{2}{3}$ =
5.	.5 = 50%	.02 = 2%	$.66\frac{2}{3}$ = 66	.625 = 62.5%

III. Per Cent Problems (90)

1. An oil tank holds 6000 gallons of oil.

1a. 5

a. If .05 of the oil is pumped out each day, what per cent of it is pumped out each day?

1b. 45%

b. How many gallons of oil are pumped out each day?

1c. _____

c. What per cent of the oil remains in the tank after 5100 gallons have been pumped out?

2. A class treasurer reports that he had $140 in the treasury at the beginning of the year. So far the class has spent $105. What per cent of the original sum should still be in the treasury?

2. _____

3. In a professional baseball game 84 baseballs were put into play by the umpire. If 28 baseballs were hit out of the park or into the stands, what per cent of the balls were lost?

3. _____

1b. 1 1c. 2. $140 − 105 = 45 3.

I. Expressing a Common Fraction as a Per Cent (90)

Write as per cents:

	a	b	c	d
1.	$\frac{1}{5} = .20 = 20\%$	$\frac{1}{40} =$	$\frac{9}{10} =$	$\frac{1}{16} =$
2.	$\frac{1}{50} =$	$\frac{3}{20} =$	$\frac{4}{25} =$	$\frac{5}{6} =$
3.	$\frac{7}{20} =$	$\frac{12}{25} =$	$\frac{1}{15} =$	$\frac{7}{8} =$
4.	$\frac{21}{50} =$	$\frac{3}{16} =$	$\frac{17}{20} =$	$\frac{3}{50} =$

II. Expressing a Per Cent as a Common Fraction (91)

Write as common fractions in lowest terms:

	a	b	c	d
1.	$60\% = \frac{60}{100} = \frac{3}{5}$	$18\% =$	$35\% =$	$10\% =$
2.	$55\% =$	$15\% =$	$95\% =$	$12\% =$

III. Per Cent Problems (91)

1. If $\frac{4}{7}$ of a class are girls, what per cent of the class are boys? 1. _____

2. A football team attempted 18 forward passes.

   a. Three passes were intercepted by the opposing team. What per cent of attempted passes were intercepted? 2a. _____

   b. If $\frac{1}{6}$ of the attempted passes were grounded, what per cent of the passes were completed? 2b. _____

3. A hockey team made 45 tries for goals. If the team scored 3 goals, what per cent of the tries were successful? 3. _____

1.	2a.	2b.	3.

Finding a Per Cent of a Number (92)

Find the missing numbers:

	a	b	c
1.	25% of 80 =	20% of 120 =	10% of 45 =
2.	1% of 160 =	50% of 240 =	5% of 600 =
3.	$33\frac{1}{3}$% of 75 =	$66\frac{2}{3}$% of 90 =	100% of 78 =
4.	4% of 95 =	6% of 380 =	12% of 490 =
5.	2.5% of 240 =	3.4% of 180 =	4.5% of 320 =
6.	75% of 950 =	1.5% of 1250 =	15% of 460 =

7. _____ **7.** A sport jacket was marked to sell for \$37.50. It was sold for 60% of this price. At what price was the jacket sold?

8. _____ **8.** Doris had 92% of the words on a spelling test spelled correctly. There were 25 words on the test. How many words did she spell correctly?

9. _____ **9.** The Marsh family took dinner at a hotel. Mr. Marsh left a tip of 15% of the cost of the dinners. Find the amount of the tip for four dinners at \$3.50 each.

10. _____ **10.** Jack earned \$1.15 on each of five days. He deposited all but 20% of his earnings in a savings account. The rest he spent. How much did he spend in all?

7.	8.	9.	10.

Finding What Per Cent One Number Is of Another Number (98)

Season Record	
Played	20
Won	17
Lost	3

1. The chart shows the record of the Valley View Basketball Team. What per cent of the games played did the team win? 1. _____

The ratio of the games won to the games played was 17 to 20, or $\frac{17}{20}$. $\frac{17}{20}$ = ?%

2. What per cent of the games played (problem **1**) did the team lose? 2. _____

Find the missing numbers:

	a	b	c
3.	4 = _____ % of 10	5 = _____ % of 20	9 = _____ % of 10
4.	3 = _____ % of 15	7 = _____ % of 100	20 = _____ % of 25
5.	10 = _____ % of 40	9 = _____ % of 9	25 = _____ % of 75
6.	9 = _____ % of 25	8 = _____ % of 60	36 = _____ % of 80
7.	14 = _____ % of 18	17 = _____ % of 20	11 = _____ % of 25
8.	2 = _____ % of 18	50 = _____ % of 125	36 = _____ % of 450
9.	2 = _____ % of 24	75 = _____ % of 225	180 = _____ % of 540
10.	11 = _____ % of 550	21 = _____ % of 350	16 = _____ % of 128

Practicing with Per Cents (99)

Find the missing numbers:

	a	b	c
1.	5% of 60 =	12 = ____% of 15	2.5% of 390 =
2.	50% of 180 =	36 = ____% of 216	3.5% of 1260 =
3.	25% of 80 =	15 = ____% of 20	1.8% of 1140 =
4.	6% of 350 =	30 = ____% of 120	3.6% of 1550 =
5.	1% of 420 =	100 = ____% of 150	5.5% of 5280 =
6.	$33\frac{1}{3}$% of 75 =	70 = ____% of 210	1.4% of 2500 =
7.	90% of 780 =	24 = ____% of 144	2.9% of 1320 =

8. ____ **8.** In an election the winning candidate received 55% of the votes cast. At that rate, how many votes should he receive from a million votes?

9. ____ **9.** A team won 17 out of 25 games played. What per cent of the games played did the team win?

10. ____ **10.** What is 10% more than 75?

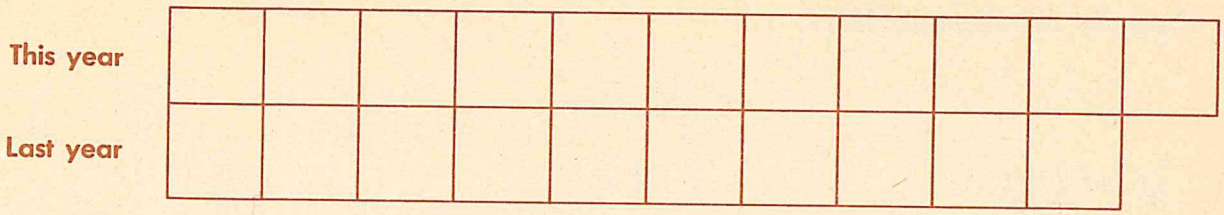
11. ____ **11.** A family spends 35% of its income for food. If the yearly income is $3,750, what is the amount spent for food?

12. ____ **12.** A team won 11 games and lost 5 games. What per cent of the games played did the team win?

13. ____ **13.** What is 10% less than 45?

8.	9.	10.	11.	12.	13.

Per Cents Greater Than 100 Per Cent (101)



The diagram compares the number of students in the 8th grade of the Madison School this year with the number last year.

1. Suppose each space represents 3 students. How many students were enrolled: **a.** last year? 1a. _____

b. this year? 1b. _____

2. What is the ratio of the number enrolled this year to the number last year? 2. _____

3. This year's enrollment is what per cent of last year's enrollment? 3. _____

The ratio of this year's enrollment to last year's enrollment is $\frac{11}{10}$.

4. Express as per cents:

a. 1.5 = **c.** 2 = **e.** $1\frac{1}{2}$ = **g.** 4 =

b. 1.25 = **d.** 2.75 = **f.** $3\frac{1}{4}$ = **h.** $1\frac{1}{3}$ =

Find the missing numbers:

	a	b	c
5.	102% of 640 =	4 = _____% of 2	105% of 48 =
6.	150% of 35 =	30 = _____% of 20	200% of 40 =
7.	125% of 780 =	27 = _____% of 25	110% of 50 =
8.	150% of 40 =	80 = _____% of 30	300% of 10 =

Finding a Fractional Part of One Per Cent (102)

Find the missing numbers:

	a	b	c
1.	$\frac{1}{2}\%$ of \$750 =	$\frac{1}{2}\%$ of 140 mi. =	$\frac{1}{4}\%$ of \$760 =
2.	$\frac{3}{4}\%$ of \$7500 =	$\frac{1}{4}\%$ of 3800 lb. =	$\frac{2}{5}\%$ of \$4500 =
3.	$\frac{3}{8}\%$ of \$5600 =	$\frac{1}{10}\%$ of \$85,000 =	$\frac{1}{5}\%$ of \$120,000 =
4.	.2% of \$16,000 =	.5% of 360 mi. =	.8% of 12,000 lb. =
5.	.4% of \$450,000 =	.6% of 5280 mi. =	.3% of \$840,000 =

6. _____ **6.** The speed of a car as shown by radar is within $\frac{1}{2}\%$ of the true speed of the car. If radar shows the speed of a car to be 70 m.p.h., what is the greatest amount of error in the speed?

7. _____ **7.** The radar of a highway patrol showed that the speed of a car was 80 m.p.h. If the greatest error of measurement of speed was $\frac{1}{2}\%$, the true speed of the car was between what two amounts?

8. _____ **8.** Of the 41,000 people at a college football game, .7% were admitted on free passes. How many people were admitted on free passes?

9. _____ **9.** The cost of insuring deposits in a bank is $\frac{1}{12}\%$. Find the cost to insure deposits of \$6,000,000.

6.	7.	8.	9.

Per Cent of Change (105)

Some state highways permit a speed of 60 m.p.h. in daylight and 50 m.p.h. at night.

1. What is the per cent of reduction in speed from daylight driving to night driving? The difference in speed is 10 m.p.h. $10 \div 60 = ?$ **1.** _____

2. What is the per cent of increase in speed from night driving to daylight driving? $10 \div 50 = ?$ **2.** _____

3. The speed for trucks in a state during daylight is 50 m.p.h. and during night, 40 m.p.h. Find: **a.** the per cent of change from night driving to daylight driving; **b.** the per cent of change from daylight driving to night driving. **3a.** _____ **3b.** _____

Find the per cent of change from:

	a	b	c
4.	10 to 20 _____	20 to 10 _____	20 to 30 _____
5.	30 to 20 _____	100 to 112 _____	100 to 93 _____
6.	60 to 40 _____	40 to 80 _____	40 to 100 _____
7.	90 to 75 _____	250 to 325 _____	72 to 84 _____
8.	300 to 250 _____	450 to 360 _____	250 to 600 _____

Finding a Number When a Per Cent of It Is Given (108)

Find the missing numbers:

	a	b	c
1.	10% of ____ = 6	15 = 50% of ____	25% of ____ = 8
2.	$33\frac{1}{3}$% of ____ = 50	14 = 10% of ____	1% of ____ = 4
3.	200% of ____ = 18	8 = 1% of ____	20% of ____ = 10
4.	15% of ____ = 75	84 = 6% of ____	30% of ____ = 72
5.	6% of ____ = 45	50 = 2.5% of ____	9% of ____ = 144
6.	120% of ____ = 390	81 = 6% of ____	150% of ____ = 66
7.	110% of ____ = 55	7.5 = 15% of ____	2% of ____ = 35

8. ____ **8.** A bicycle was sold at a "special sale" for \$40 at 80% of the regular price. What was the regular price?

9. ____ **9.** A suit sold at \$60 at 80% of the regular price. What was the regular price?

I. Number Quickies in Per Cent (112)

1. A cent is what per cent of a dollar? 1. _____
2. A quarter is what per cent of a dollar? 2. _____
3. A cent is what per cent of a dime? 3. _____
4. A nickel is what per cent of a half dollar? 4. _____
5. A pint is what per cent of a quart? 5. _____
6. A gallon is what per cent of a quart? 6. _____
7. A foot is what per cent of a yard? 7. _____
8. A pound is what per cent of 8 ounces? 8. _____
9. A pint is what per cent of 16 fluid ounces? 9. _____
10. A millimeter is what per cent of a centimeter? 10. _____
11. A centimeter is what per cent of a meter? 11. _____
12. Ten millimeters are what per cent of a centimeter? 12. _____
13. What per cent of a kilometer are 100 meters? 13. _____

II. Practicing with Per Cents (112)

Find the missing numbers:

	a	b	c
1.	10% of 90 =	1% of _____ = 16	8 = _____% of 24
2.	70% of 60 =	200% of _____ = 16	90 = _____% of 36
3.	2.3% of 320 =	15% of _____ = 180	72 = _____% of 48
4.	110% of 450 =	10% of _____ = 12	50 = _____% of 125
5.	$\frac{1}{2}$% of 780 =	150% of _____ = 30	75 = _____% of 50

Steps in the Development of Per Cent (115)

Find the missing numbers in the following:

1. Change to per cents:

a. .3 = **c.** .36 = **e.** 2 = **g.** .025 =

b. 1.2 = **d.** .04 = **f.** 1.06 = **h.** .125 =

2. Write in the decimal form:

a. 15% = **c.** 130% = **e.** 300% = **g.** 2.5 % =

b. 40% = **d.** 102% = **f.** 6% = **h.** 14.3% =

3. Change to common fractions expressed in lowest terms:

a. 20% = **c.** 10% = **e.** $37\frac{1}{2}\%$ = **g.** $87\frac{1}{2}\%$ =

b. 75% = **d.** $33\frac{1}{3}\%$ = **f.** 40% = **h.** 35% =

4. Write as per cents:

a. $\frac{1}{4}$ = **c.** $\frac{7}{10}$ = **e.** $\frac{1}{8}$ = **g.** $1\frac{1}{3}$ =

b. $\frac{3}{5}$ = **d.** $\frac{2}{3}$ = **f.** $\frac{7}{8}$ = **h.** $2\frac{3}{4}$ =

Find the percentages:

	a	b	c
5.	2% of 60 =	1.5% of 200 =	$33\frac{1}{3}\%$ of 150 =
6.	200% of 40 =	125% of 40 =	102% of 800 =

Find the per cents:

7.	15 = _____ % of 20	4% of _____ = 12	30 = _____ % of 150
8.	20 = _____ % of 10	120% of _____ = 60	150 = _____ % of 120
9.	75 = _____ % of 60	140% of _____ = 70	36 = _____ % of 20

The Sales Dollar (118)

1. A merchant bought a chair for \$50 and sold it for \$80. The expenses were \$20. What was the profit?

\$80 selling price	\$30 mark-up
−50 cost	−20 expenses
\$30 mark-up	10 profit

1. _____

2. The profit in problem **1** was what per cent of the selling price? 2. _____

3. The mark-up in problem **1** was what per cent of the cost? 3. _____

	Cost	Mark-up	Expenses	Profit	Loss	Selling Price
4.	\$22.50	_____	\$3.75	_____		\$29.95
5.	\$8.35	\$2.90	_____	\$1.75		_____
6.	\$15	\$7.50	\$9		_____	_____
7.	\$45.38	_____	\$6.27	_____		\$55.75
8.	_____	\$22.50	\$15.65	_____		\$82.25
9.	_____	\$7.35	\$10.15		_____	\$35.20
10.	\$432	\$167.50	\$115.60	_____		_____
11.	\$87.50	\$16.75	_____		\$1.10	_____
12.	\$74.95	\$34.85	_____	\$17.58		_____

I. Trade Discount (119)

Find the net cost of the following:

	List Price	Rate of Discount	Net Cost		List Price	Rate of Discount	Net Cost
1.	$45	15%	_____	6.	$925	35%	_____
2.	$150	25%	_____	7.	$486	10%	_____
3.	$475	12%	_____	8.	$516	$33\frac{1}{3}\%$	_____
4.	$85	18%	_____	9.	$1040	22%	_____
5.	$540	16%	_____	10.	$850	24%	_____

11. _____ **11.** A dealer is given a trade discount of 24% of the list price of a new car. The list price is $3,245. What is the net cost?

12. _____ **12.** The list price of a TV is $250. A dealer pays $175 for the TV. What is the per cent of discount?

II. Practicing Per Cents (119)

Find the missing numbers:

	a	b	c
1.	1% of 320 =	50 = _____% of 40	25 = 50% of _____
2.	100% of 132 =	10 = _____% of 25	15 = 3% of _____
3.	1.5% of 640 =	45 = _____% of 900	60 = 150% of _____
4.	$\frac{1}{4}\%$ of 820 =	12 = _____% of 600	90 = 6% of _____
5.	3.4% of 750 =	14 = _____% of 7	70 = 200% of _____
6.	$\frac{1}{2}\%$ of 720 =	72 = _____% of 240	4 = 1% of _____

I. Successive Discounts (120)

Find the missing numbers:

	List Price	Rates of Discount	Net Cost		List Price	Rates of Discount	Net Cost
1.	$80	10%, 10%	_____	4.	$750	20%, 10%	_____
2.	$460	25%, 5%	_____	5.	$45	10%, 2%	_____
3.	$320	25%, 10%	_____	6.	$165	$33\frac{1}{3}$%, 5%	_____

II. Problems in Discount (120)

1. A dealer received discounts of 30% and 10% on a record player listed at $280. What was the net cost to the dealer? 1. _____

2. A single discount of 20% on a piece of furniture was equal to $30. What was the list price of the article? 2. _____

3. A bill of goods was listed at $240 less discounts of 20% and 10%. A clerk deducted one discount of 30%. What was the amount of error in the bill? 3. _____

4. A football listed at $25 was sold for $17.50. What was the per cent of discount? 4. _____

5. A jewelry store advertised a $4.80 bracelet at a $33\frac{1}{3}$% discount. What is the cost of the bracelet if the federal tax is 10% and the state sales tax is 3%? (Both taxes are based on the selling price.) 5. _____

6. A camera is listed at $55.00 less discounts of 28% and 2%. To the nearest cent what is the net cost of the camera? 6. _____

1.	2.	3.	4.	5.	6.

I. Selecting the Best Answer (121)

Use approximation. Write on the blank the answer from the answers given which is nearest the correct answer. Check your selection by solving the example.

1. _____	**1.** 11% of 457 = (?)	: 45; 48; 4.6
2. _____	**2.** 103% of 716 = (?)	: 75; 710; 730
3. _____	**3.** 52 = 5% of (?)	: 1100; 110; 250
4. _____	**4.** 78 = (?) % of 98	: 80%; 70%; 120%
5. _____	**5.** $\frac{1}{4}$% of 1420 = (?)	: 68; 4; 43
6. _____	**6.** 25 = 9% of (?)	: 250; 27; 2500
7. _____	**7.** 3.8% of 1238 = (?)	: 36; 45; 450
8. _____	**8.** 102 × 970 = (?)	: 10,000; 90,000; 100,000
9. _____	**9.** 29,548 ÷ 148 = (?)	: 20.3; 203; 2000
10. _____	**10.** 58.17 ÷ 1.9 = (?)	: 30; 300; 3

II. Number Quickies (121)

1. _____ **1.** How many fluid ounces are there in $1\frac{1}{2}$ quarts?

2. _____ **2.** How many minutes are there in .6 hour?

3. _____ **3.** What per cent of $\frac{1}{2}$ is $\frac{1}{4}$?

4. _____ **4.** There are how many thousandths in .7?

5. Use any of the digits 1, 2, 3, and 5. Do not repeat a digit in a number. Write:

5a. _____ **a.** The largest number less than 2,500.

5b. _____ **b.** The largest whole number when 5 is in tens' place.

5c. _____ **c.** The largest three-place decimal less than .3.

5d. _____ **d.** The largest three-place decimal with 3 in tenths' place.

Practicing the Fundamentals (122)

a **b** **c** **d** **e**

1. Add:

a	b	c	d	e
.6 7 8 .3 5 0 .7 4 8 .9 6 5	$3\frac{1}{2}$ $9\frac{3}{4}$ $1\frac{7}{8}$	$7\frac{1}{6}$ $8\frac{2}{3}$ $\frac{1}{2}$	$\frac{1}{2}$ $\frac{1}{3}$ $\frac{5}{8}$	9 min. 35 sec. 7 min. 28 sec. 55 sec.

2. Subtract:

a	b	c	d	e
3 0,1 2 4 1 9,4 5 6	.0 7 5 .0 6 8	$12\frac{3}{4}$ $9\frac{7}{8}$	$1\frac{1}{3}$ $\frac{5}{6}$	5 pt. 6 fl. oz. 2 pt. 10 fl. oz.

3. Multiply:

a	b	c	d	e
7 6 0 8 0	7.6 1.5	$56\frac{3}{4}$ 8	$\frac{3}{4} \times 1\frac{2}{3} =$	$2\frac{1}{2} \times \frac{3}{8} \times 3\frac{1}{3} =$

4. Divide:

a	b	c	d	e
$18\overline{)7\,3\,1\,2}$	$1.6\overline{)8}$	$.48\overline{)7.2}$	$6 \div \frac{4}{5} =$	$1\frac{1}{2} \div 3\frac{1}{4} =$

5. Find the value of:

a. $\frac{1}{2}\%$ of 1240 =

b. 75 = _____ % of 225

c. 18 = 3% of _____

Test on Unit III

Write the missing numbers:

	a	b	c
1.	10% of 160 =	20 = _____% of 25	50% of _____ = 30
2.	2.3% of 540 =	36 = _____% of 48	7% of _____ = 21
3.	120% of 420 =	48 = _____% of 40	150% of _____ = 75

4. _____ **4.** A test containing 25 questions was marked in per cent. What per cent should have been given to each question?

5. _____ **5.** A team won 17 games and lost 8 games. What per cent of the games played did the team win?

6. _____ **6.** The cost of a dictionary at 60% of the regular price was \$5.40. What was the regular price?

4.	5.	6.

7. _____ **7.** An accountant charges $\frac{1}{2}$% of gross income to prepare an income tax return. If the gross income is \$21,540 what would the accountant charge?

8. _____ **8.** The list price of a book is \$6.25. A trade discount of 20% is given. What is the net cost of the book?

9. _____ **9.** The cost of a suit was \$40. The mark-up was 75% of the cost. The expenses were \$18. What was the profit?

7.	8.	9.

Unit IV. Areas and Perimeters

The Area and Perimeter of a Rectangle (130)

1. Write the formula for the area of a rectangle. 1. _____

2. In the formula, $A = lw$, if $l = 8$ ft. and $w = 5$ ft., what is the value of A? 2. _____

3. In the formula, $p = 2(l + w)$, if $l = 9$ in. and $w = 5$ in., what is the value of p? 3. _____

4. Write the formula for the area of a square. 4. _____

5. Write the formula for the perimeter of a square. 5. _____

Below are the dimensions of some rectangles. Find the area and the perimeter of each rectangle.

	l	w	A	p		l	w	A	p
6.	12 ft.	9 ft.			8.	$7\frac{1}{2}$ in.	4 in.		
7.	14 in.	9 in.			9.	$2\frac{1}{2}$ mi.	$1\frac{1}{2}$ mi.		
10.	9.6 ft.	6.5 ft.			12.	8.5 cm.	48 cm.		
11.	25 cm.	15 cm.			13.	1.5 mi.	1.5 mi.		

14. In which of the above examples is the rectangle a square? 14. _____

15. A photograph is a square 35 millimeters on a side. What is the area of the photograph? 15. _____

16. The perimeter of a square is 26 inches. What is the area of the square? 16. _____

17. The length of a rectangle is twice the width. If the width is 9 inches, what is the perimeter of the rectangle? 17. _____

15.	16.	17.

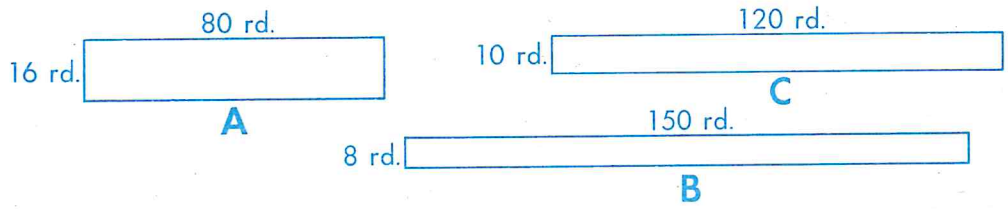
Measuring Surfaces (135)

1. Find the number of acres represented in each of the following figures:

1A. _____

1B. _____

1C. _____



2. _____ **2.** There are 320 rods in a mile. What part of a mile is a distance of 40 rods?

3. _____ **3.** The length of a race track is a **furlong**, or $\frac{1}{8}$ mile. How many rods long is the track?

4. _____ **4.** A field is a square $\frac{1}{8}$ mile on a side. How many acres does the field contain?

1.	2.	3.	4.

5. _____ **5.** An acre contains 43,560 square feet. The area of which of the following squares is nearest to an acre if the side of the square is: **a.** 200 ft. **b.** 205 ft. **c.** 210 ft.?

6. _____ **6.** If a man owns a building lot 60′ x 121′, what fractional part of an acre is his lot?

7. _____ **7.** A **section** of land is 1 mile square and it contains 640 acres. How many acres are there in a farm containing $\frac{1}{4}$ section?

8. _____ **8.** A rectangular park is 1 mile long and $\frac{1}{2}$ mile wide. How many acres does it contain?

5.	6.	7.	8.

I. Practicing Per Cents (137)

Find the missing numbers:

	a	b	c
1.	1% of 750 =	12 = _____% of 18	15 = 50% of _____
2.	25% of 200 =	40 = _____% of 20	60 = 300% of _____
3.	2.3% of 950 =	450 = _____% of 225	1.8 = 1% of _____
4.	3.7% of 150 =	51 = _____% of 17	180 = 40% of _____
5.	$\frac{1}{2}$% of 840 =	80 = _____% of 500	45 = 6% of _____

II. Number Quickies (137)

1. What is the perimeter of a square 25 centimeters on a side? 1. _____

2. The length of a rectangle is twice its width. If the length is 1 yard, how many inches is in the width? 2. _____

3. Express 3.5 meters as centimeters. 3. _____

4. At a rate of 300 m.p.h., how many minutes will it take an airplane to travel 50 miles? 4. _____

5. A car travels 7.5 miles in 10 minutes. At that rate, what is the speed per hour? 5. _____

6. Three quarts are what per cent of a gallon? 6. _____

7. A dozen large eggs weigh 26 ounces. Express the weight in pounds. 7. _____

8. What number except zero multiplied by itself is equal to the number? 8. _____

9. If .6 of a number is 30, what is the number? 9. _____

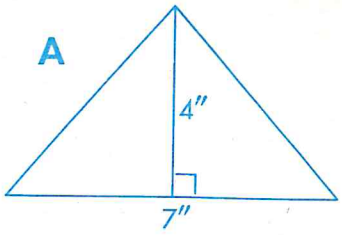
Finding the Area of Triangles (139)

1. What is the length of the altitude of:

1a. _____ a. triangle **A**?

1b. _____ b. triangle **B**?

1c. _____ c. triangle **C**?

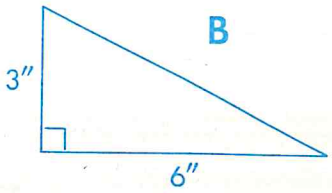


2. What is the length of the base of:

2a. _____ a. triangle **A**?

2b. _____ b. triangle **B**?

2c. _____ c. triangle **C**?

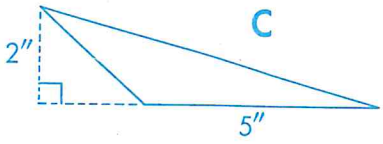


3. Find the area of:

3a. _____ a. triangle **A**.

3b. _____ b. triangle **B**.

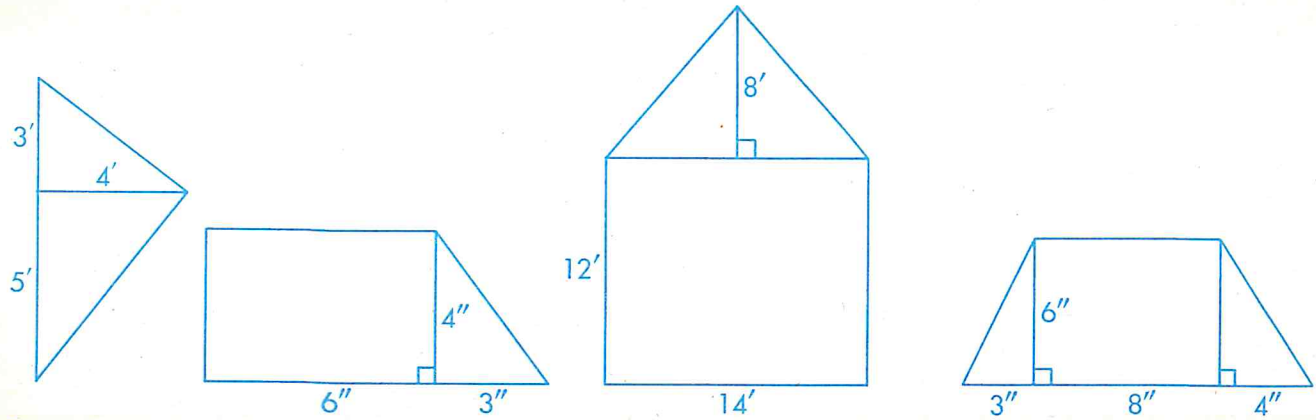
3c. _____ c. triangle **C**.



Find the area of triangles having dimensions of:

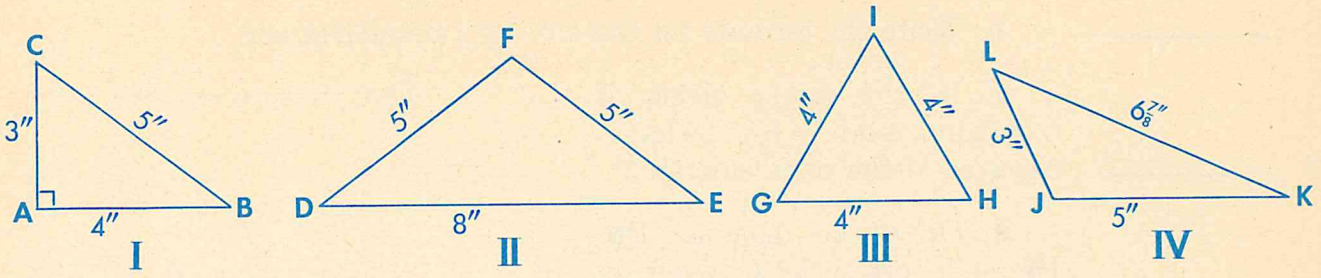
	Base	Altitude	Area		Base	Altitude	Area
4.	16 ft.	18 ft.	_____	6.	$4\frac{1}{2}$ in.	8 in.	_____
5.	35 cm.	24 cm.	_____	7.	12 in.	$9\frac{1}{2}$ in.	_____
8.	1 mi.	$\frac{3}{4}$ mi.	_____	10.	8.7 ft.	9.6 ft.	_____
9.	7.6 ft.	10.4 ft.	_____	11.	2.8 m.	1.9 m.	_____

12. Below each of the figures, write the area represented by the figure.



I A=_____ II A=_____ III A=_____ IV A=_____

Characteristics of Triangles (143)



1. Which of the triangles is an equilateral triangle? 1. _____

2. Which of the triangles is an obtuse triangle? 2. _____

3. Which of the triangles is a right triangle? 3. _____

4. What is the perimeter of the triangle which is isosceles but not equilateral? 4. _____

5. From the dimensions given it is possible to find the area of one of the triangles. What is its area? 5. _____

6. Which of the triangles has the: a. greatest perimeter? 6a. _____

b. least perimeter? 6b. _____

7. How many degrees are there in each angle of an equilateral triangle? 7. _____

8. A right triangle has one of its acute angles equal to 30°. How many degrees are there in the other acute angle? 8. _____

9. In what kind of triangle is one of the sides an altitude of the triangle? 9. _____

10. The altitude of the equilateral triangle shown is 3.4 inches. What is the area of this triangle? 10. _____

11. If angle **B** contains 37°, how many degrees are there in angle **C**? (Triangle I) 11. _____

12. Angles **D** and **E** are equal. If each angle is 38°, how many degrees are there in angle **F**? (Triangle II) 12. _____

13. The obtuse angle shown contains 115°. How many degrees are there in the sum of the other two angles? 13. _____

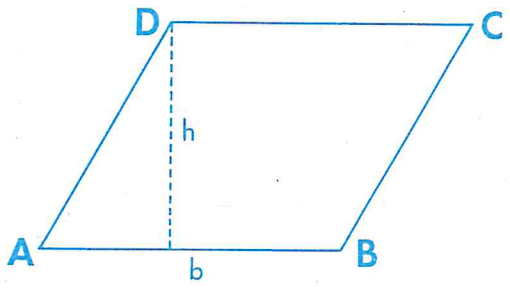
10.	11.	12.	13.

Finding the Area of a Parallelogram (145)

1. _____ 1. Write the formula for the area of a parallelogram.

2. _____ 2. In the figure given, if b = 8 in., and h = 6 in., what is the area of the parallelogram?

3. _____ 3. Draw the diagonal **DB**. Use the dimensions given in problem **2**. What is the area of each triangle formed?



Find the area of parallelograms having dimensions of:

	Base	Altitude	Area		Base	Altitude	Area
4.	18 ft.	14 ft.	_____	**6.**	12 in.	$9\frac{1}{2}$ in.	_____
5.	25 cm.	18 cm.	_____	**7.**	27 yd.	15 yd.	_____
8.	$5\frac{1}{2}$ in.	$8\frac{1}{2}$ in.	_____	**10.**	38 cm.	24 cm.	_____
9.	12.5 ft.	9.6 ft.	_____	**11.**	6.5 ft.	3.5 ft.	_____

12. _____ **12.** A triangle and a parallelogram have equal bases and equal altitudes. The area of the triangle is what per cent of the area of the parallelogram?

13. _____ **13.** The bases and areas of a triangle and a parallelogram are equal. The altitude of the triangle is what per cent of the altitude of the parallelogram?

14. _____ **14.** In the parallelogram given above, what kind of angles are angles **D** and **B**?

15. _____ **15.** What kind of angles are angles **A** and **C**?

16. There are how many degrees in the sum of the angles in:

16a. _____ **a.** triangle **ADB**?

16b. _____ **b.** triangle **BCD**?

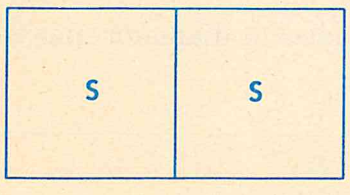
The Area of a Trapezoid (147)

1. Write the formula for the area of a trapezoid. **1.** _____

Find the areas of trapezoids having dimensions of:

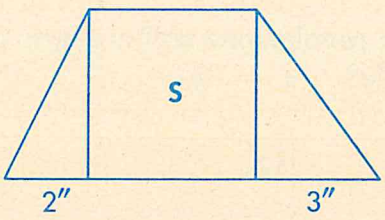
	Altitude	Upper Base	Lower Base	Area
2.	9 in.	12 in.	8 in.	_____
3.	12 ft.	7 ft.	15 ft.	_____
4.	2 yd.	4 yd.	6 yd.	_____
5.	50 ft.	40 ft.	80 ft.	_____
6.	60 ft.	70 ft.	90 ft.	_____
7.	20 in.	30 in.	60 in.	_____
8.	3.7 ft.	7.3 ft.	12.5 ft.	_____
9.	5.4 ft.	3.6 ft.	7.4 ft.	_____
10.	15 yd.	24 yd.	12 yd.	_____
11.	$4\frac{1}{2}$ in.	8 in.	12 in.	_____
12.	16 ft.	$12\frac{1}{2}$ ft.	$16\frac{1}{2}$ ft.	_____
13.	4 m.	9.2 m.	6.5 m.	_____

14. Each part of the figures represented by **s** is a square having a side of 4 inches. Below each figure, write its area.



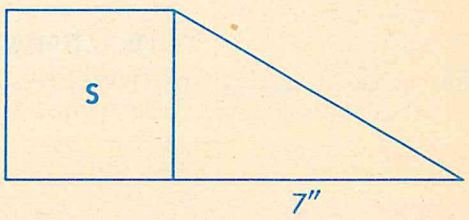
I

A = _____



II

A = _____



III

A = _____

Finding the Circumference of a Circle (150)

1. _____ **1.** Since **d** = **2r**, write the formula for the circumference using **r** instead of **d**.

Find the circumference of each of the following:

Use $\pi = 3.14$

2. _____ **2.** d = 6 in.

3. _____ **3.** d = 10 ft.

4. _____ **4.** d = 25 cm.

5. _____ **5.** r = 5 in.

6. _____ **6.** r = 3.5 mi.

7. _____ **7.** r = 1 ft.

8. _____ **8.** d = 16 in.

Use $\pi = 3\frac{1}{7}$

9. _____ **9.** r = 21 in.

10. _____ **10.** r = 350 yd.

11. _____ **11.** d = 28 in.

12. _____ **12.** d = 42 cm.

13. _____ **13.** d = 14 in.

14. _____ **14.** r = $3\frac{1}{2}$ in.

15. _____ **15.** r = 14 in.

16. _____ **16.** A circular grass plot is 50 feet in diameter. What is the distance around the plot? ($\pi = 3.14$)

17. _____ **17.** A bicycle wheel is 28 inches in diameter. How many feet will a point on the circumference travel in 12 revolutions of the wheel? ($\pi = 3\frac{1}{7}$)

18. _____ **18.** How many revolutions will a wheel 14 inches in diameter make in traveling a mile? ($\pi = 3\frac{1}{7}$)

16.	17.	18.

Finding the Area of a Circle (152)

1. Write the formula for the area of a circle. 1. _____

2. Find the area of a circle with a radius of 4 inches. 2. _____

Find the area of each of the following:

$\pi = 3.14$

3. r = 5 in. 3. _____

4. r = 2 ft. 4. _____

5. d = 1 mi. 5. _____

6. r = 25 cm. 6. _____

$\pi = 3\frac{1}{7}$

7. r = 7 in. 7. _____

8. r = 3.5 ft. 8. _____

9. r = 14 in. 9. _____

10. d = 70 cm. 10. _____

11. A circular frying pan has a diameter of 11 inches. A square frying pan has a side of 11 inches.

a. What is the radius of the circular pan? 11a. _____

b. To the nearest square inch, what is the area of the circular pan? ($\pi = 3.14$) 11b. _____

c. What is the area of the square pan? 11c. _____

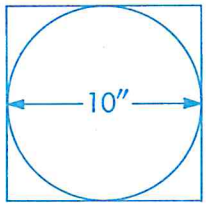
d. Use the answers from b and c. How much greater surface does the bottom of the square pan contain than does the bottom of the circular pan? 11d. _____

Problems Dealing with Circles (154)

1. A ferris wheel is 21 feet in diameter. How many feet does a point on the circumference move in one revolution of the wheel? ($\pi = 3\frac{1}{7}$)

1. _____

2. Use the figure on the right.



2a. _____ a. What is the radius of the circle?

2b. _____ b. To the nearest square inch, what is the area of the circle? ($\pi = 3.14$)

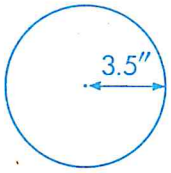
2c. _____ c. What is the area of the square?

2d. _____ d. The area of the circle is what per cent of the area of the square?

3. The diameter of the earth is approximately 8,000 miles. To the nearest 1,000 miles, what is the distance around the earth at the equator?

3. _____

4. Use the two circles on the right. ($\pi = 3\frac{1}{7}$)

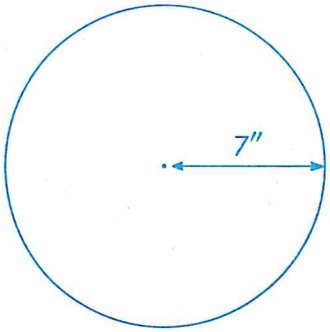


A

4a. _____ a. The radius of **B** is how many times the radius of **A**?

4b. _____ b. How many inches long is the circumference of **A**?

4c. _____ c. How many inches long is the circumference of **B**?



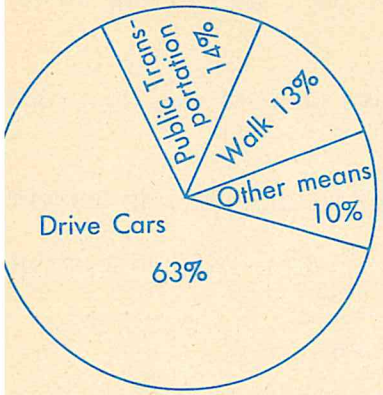
4d. _____ d. What is the area of **A**?

4e. _____ e. What is the area of **B**?

4f. _____ f. The area of **B** is how many times the area of **A**?

B

Circle Graphs (155)



The circle graph shows the means people of this country use to get to their places of work.

1. What fraction having a denominator of 8 represents the part of the people who drive cars to their places of business? 1. _____

2. About what per cent of the people do not drive cars to their places of business? 2. _____

3. Each part of the graph represents a certain per cent of the circle. The angles at the center are called **central angles.** Each central angle contains the given per cent of 360°.

To the nearest whole number of degrees, find the number of degrees in he central angle to represent:

a. The number of people who use public transportation
14% of 360° = .14 × 360° = 50.4°

To the nearest degree, 50.4° = ? 3a. _____

b. The number who walk to work 3b. _____

c. The number who drive cars 3c. _____

d. The number who use other means. 3d. _____

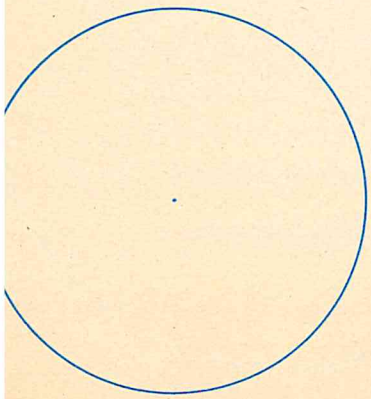
4. To the nearest degree, find:

a. 23% of 360° =

b. 44% of 360° =

c. 72% of 360° =

d. 28% of 360° =



5. In the circle on the left, draw central angles to represent **4c** and **4d**. The angle to represent **4c** is greater than 180° because the angle is more than 50% of the circle. To draw an angle greater than 180°, subtract the angle from 360° and draw this angle. The larger angle in the circle will be the given angle.

Drawing Circle Graphs (157)

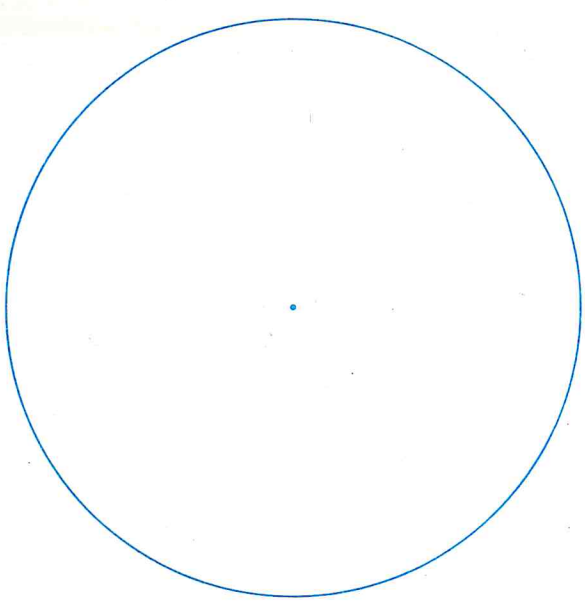
In the space below, draw circle graphs to represent the following:

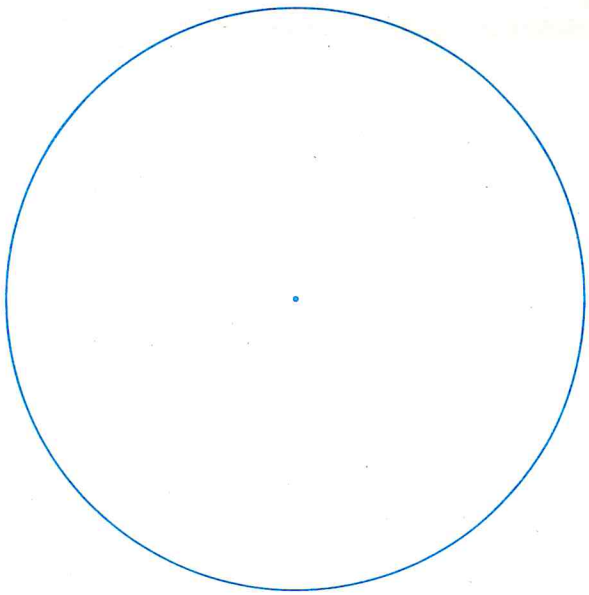
1. The population of our country is distributed as follows: 33% live in big cities; 23% live near big cities; 44% live in other areas.

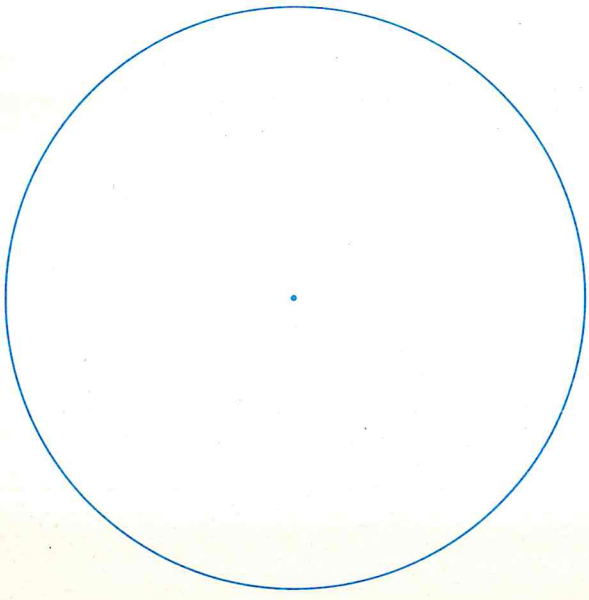
2. The causes of automobile accidents are as follows: Defective parts of car, 8%; road conditions, 5%; carelessness of drivers or of pedestrians, 87%.

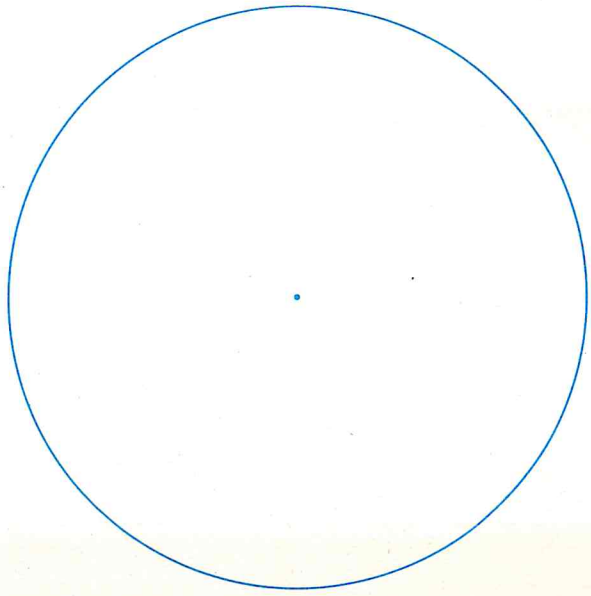
3. In a certain department store, 62% of the sales dollar is cost and 38% is margin.

4. A family income of $4,200 is spent as follows: Food, 35%; rent, 24%; operation, 20%; other items, the remainder.









Practicing the Fundamentals (159)

a	b	c	d	e

1. Add:

a	b	c	d	e
748 3925 86 879 4057	.375 .486 .925 .198	$\frac{3}{4}$ $\frac{1}{2}$ $\frac{11}{16}$	$5\frac{2}{3}$ $8\frac{1}{2}$ $\frac{7}{12}$	3 min. 25 sec. 8 min. 48 sec. 36 sec.

2. Subtract:

a	b	c	d	e
41,103 37,218	.725 .718	$11\frac{1}{2}$ $2\frac{7}{8}$	$5\frac{1}{3}$ $4\frac{5}{6}$	4 pt. 6 fl. oz. 1 pt. 14 fl. oz.

3. Multiply:

a	b	c	d	e
678 47	3.25 .6	$78\frac{3}{4}$ 6	$\frac{7}{8}$ of 120 =	$2\frac{1}{2} \times 1\frac{1}{4} \times \frac{4}{5} =$

4. Divide:

a	b	c	d	e
$37\overline{)3\,4{,}4\,1\,3}$	$1.6\overline{)9\,4}$	$1.8\overline{)1.4\,4}$	$360 \div \frac{5}{8} =$	$3\frac{1}{2} \div 1\frac{1}{4} =$

5. Find the value of:

a. $\frac{1}{4}\%$ of 960 =

b. 160 = _____% of 240

c. 40 = 5% of _____

Reviewing Rectangles and Triangles (160)

1. _____ **1.** Write the formula for the area of a square.

2. _____ **2.** Find the perimeter of a square having a side of 3.8 inches.

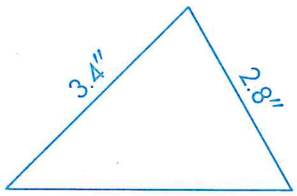
3a. _____ **3.** The length of a rectangle is twice its width. The width is 6 inches. **a.** What is the length?

3b. _____ **b.** What is the area of the rectangle?

4. _____ **4.** Find the perimeter of a rectangle 26 centimeters wide and 45 centimeters long.

5. _____ **5.** The window area of a classroom should be at least 20% of the floor area. What should be the least number of square feet of window space in a classroom 26 feet wide and 32 feet long?

6. _____ **6.** Find the perimeter of an equilateral triangle having sides of $7\frac{1}{2}$ inches.

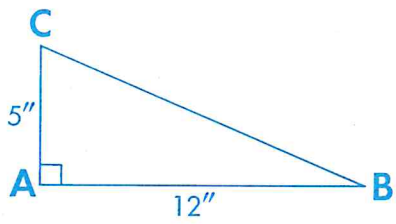


7. _____ **7.** The perimeter of the triangle on the left is 10 inches. What is the length of the third side?

8. _____ **8.** What kind of triangle is triangle **ABC**?

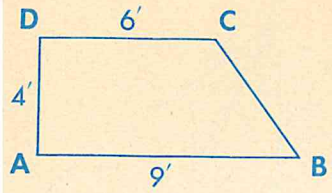
9. _____ **9.** What is the area of triangle **ABC**?

10. _____ **10.** If angle **B** (problem **8**) is 23°, how many degrees are there in angle **C**?



11. _____ **11.** An isosceles triangle has two equal angles. If one of the equal angles contains 53°, how many degrees are there in the third angle?

Reviewing Trapezoids and Circles (160)



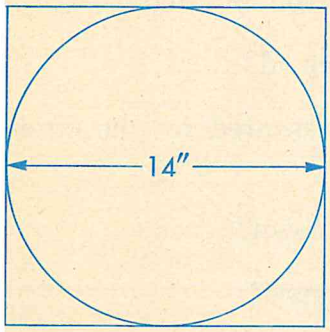
1. Angles **A** and **D** of the trapezoid shown are right angles. What kind of angle is:

a. angle **B**? 1a. _____

b. angle **C**? 1b. _____

2. What is the area represented by the trapezoid? 2. _____

3. In the trapezoid, draw **CE** perpendicular to **AB**. What is the area of the triangle **CEB**? 3. _____



4. In the figure on the left, the perimeter of the square is how much greater than the circumference of the circle? ($\pi = 3\frac{1}{7}$) 4. _____

5. What is the area represented by the circle? 5. _____

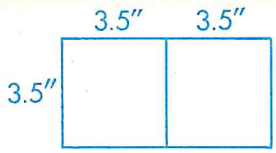
(Draw graph here)

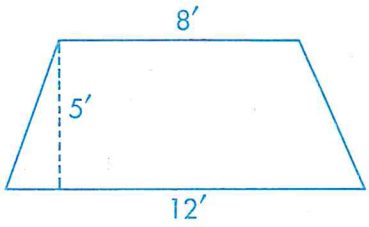
6. Of the students who graduate from high school, 20% enter college, 20% enter skilled trades, and the remainder enter other types of work. Show these facts with a circle graph.

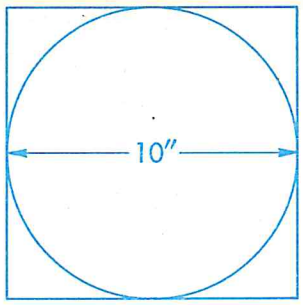
a. How many degrees are there in the central angle to represent the number of graduates who enter other types of work? 6a. _____

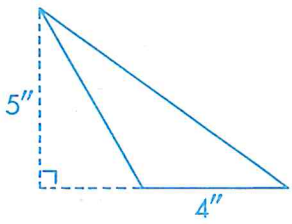
b. Consider a group of a million students who graduate from high school. On the average, how many will enter college? 6b. _____

Test on Unit IV









1. _____ **1.** What is the perimeter of the figure represented by the rectangle?

2. _____ **2.** What is the area of each square shown in the rectangle?

3. _____ **3.** What is the area represented by the trapezoid?

4. _____ **4.** How much less is the circumference represented by the circle than the perimeter represented by the square? ($\pi = 3.14$)

5a. _____ **5. a.** What kind of triangle is the triangle shown?

5b. _____ **b.** What is the area represented by the figure?

6. _____ **6.** Two angles of a triangle are 38° and 74°. How many degrees are there in the third angle?

7. _____ **7.** A right triangle has one of its acute angles equal to 56°. How many degrees are there in the other acute angle?

8. _____ **8.** One of the equal sides of an isosceles triangle is 4.7 feet. The perimeter of the triangle is 12 feet. What is the length of the third side?

9. _____ **9.** One part of a circle graph represents 35% of the circle. How many degrees are there in the central angle to represent this part of the graph?

10. _____ **10.** What is the area of a circle 14 inches in diameter? ($\pi = 3\frac{1}{7}$)

Unit V. Finding Simple Interest

The Interest Formula (166)

The formula for finding interest is **i = prt. The amount is equal to principal plus interest.**

1. If the interest is \$4.80 and the principal is \$120, what is the amount? **1.** _____

Find the missing numbers:

	Prin.	Rate	Time	Int.	Amount
2.	\$350	3%	1 yr.	_____	_____
3.	\$125	6%	$\frac{1}{2}$ yr.	_____	_____
4.	\$750	2%	$\frac{1}{2}$ yr.	_____	_____
5.	\$460	$2\frac{1}{2}$%	1 yr.	_____	_____
6.	\$840	4%	$1\frac{1}{2}$ yr.	_____	_____
7.	\$550	6%	$\frac{1}{2}$ yr.	_____	_____
8.	\$375	4%	6 mo.	_____	_____
9.	\$720	6%	$\frac{3}{4}$ yr.	_____	_____
10.	\$150	6%	$\frac{1}{2}$ yr.	_____	_____
11.	\$960	3%	$1\frac{1}{2}$ yr.	_____	_____
12.	\$1250	$2\frac{1}{2}$%	1 yr.	_____	_____
13.	\$2450	$3\frac{1}{2}$%	1 yr.	_____	_____

14. The interest for 1 year on \$1000 at 3% is the same as the interest on \$1000 at 6% for how long a period of time? **14.** _____

15. It would take how much principal at 2% for a year to give the same interest as the interest on \$100 at 4% for 1 year? **15.** _____

16. The amount is \$327.50 and the interest is \$7.50. What is the principal? **16.** _____

17. If p = principal, i = interest, and A = amount, write the formula for A. **17.** _____

18. Use the letters in problem **17.** Write the formula for p. **18.** _____

Finding Interest for Short Periods of Time (167)

1. Express as fractional parts of a year of 360 days:

a. 30 da. =	**c.** 42 da. =	**e.** 75 da. =	**g.** 90 da. =
b. 120 da. =	**d.** 72 da. =	**f.** 60 da. =	**h.** 108 da. =

Find the interest to the nearest cent:

	Principal	Rate	Time	Interest		Principal	Rate	Time	Interest
2.	$300	5%	30 da.	_____	**4.**	$450	6%	30 da.	_____
3.	$500	4%	45 da.	_____	**5.**	$250	4%	120 da.	_____
6.	$850	5%	45 da.	_____	**8.**	$350	6%	72 da.	_____
7.	$900	6%	60 da.	_____	**9.**	$100	6%	61 da.	_____
10.	$1250	4%	180 da.	_____	**12.**	$1550	5%	30 da.	_____
11.	$3000	6%	42 da.	_____	**13.**	$1400	5%	75 da.	_____

14. _____ **14.** The interest on $100 at 6% for 30 days is the same as the interest on $100 at 3% for how many days?

15. _____ **15.** The interest on $100 at 4% for 1 month is the same as the interest at 2% for 1 month on what principal?

16. _____ **16.** The interest on $600 for 60 days at 6% is the same as the interest on $1200 for 60 days at what rate?

Finding the Rate of Interest (169)

1. The interest on a loan of \$200 for 6 months was \$4. What was the rate of interest? **1.** _____

p = \$200
i = \$4 for 6 mo.
r = ?

i = \$8 for 1 yr.
r = \$8 ÷ \$200 =

Find the yearly interest when the interest for:

	a	b	c
2.	6 mo. is \$7.50 _____	$\frac{1}{2}$ yr. is \$12.15 _____	4 mo. is \$2.60 _____
3.	3 mo. is \$4.25 _____	9 mo. is \$15.75 _____	8 mo. is \$4.40 _____

Find the rate of interest on the following:

	Principal	Interest	Time	Rate		Principal	Interest	Time	Rate
4.	\$800	\$16	6 mo.	_____	**6.**	\$300	\$6	6 mo.	_____
5.	\$1200	\$30	6 mo.	_____	**7.**	\$300	\$4.50	4 mo.	_____
8.	\$600	\$10	4 mo.	_____	**10.**	\$300	\$5	4 mo.	_____
9.	\$250	\$10	6 mo.	_____	**11.**	\$400	\$10	3 mo.	_____
12.	\$1000	\$25	$\frac{1}{2}$ yr.	_____	**14.**	\$5000	\$25	3 mo.	_____
13.	\$2500	\$50	6 mo.	_____	**15.**	\$1000	\$55	1 yr.	_____

16. Interest at 6% for a year is the same as interest at what rate for a half year? **16.** _____

17. Interest at a monthly rate of $\frac{1}{2}$% is the same as what yearly rate? **17.** _____

Discounting a Note (171)

1. ____ **1.** At a bank Miss Rand made a loan of \$300 at 6% for 60 days. What were the proceeds?

p = \$300
r = 6%
t = 60 da., or $\frac{1}{6}$ yr.
Proceeds = ?

2. ____ **2.** The bank discount on a loan of \$450 is \$9. What are the proceeds?

3. ____ **3.** The proceeds are \$220 and the discount is \$5. What is the amount of the loan?

Find the missing numbers:

	Loan	Rate	Time	Discount	Proceeds		Loan	Rate	Time	Discount	Proceeds
4.	\$300	5%	60 da.			**6.**	\$375	4%	60 da.		
5.	\$400	6%	90 da.			**7.**	\$840	$5\frac{1}{2}$%	90 da.		
8.	\$420	6%	45 da.			**10.**	\$150	6%	90 da.		
9.	\$720	5%	120 da.			**11.**	\$525	4%	60 da.		
12.	\$2400	5%	45 da.			**14.**	\$1500	$4\frac{1}{2}$%	60 da.		
13.	\$1000	$5\frac{1}{2}$%	72 da.			**15.**	\$3250	4%	108 da.		

I. Finding the Number of Days Between Dates (175)

1. Mr. West made a loan from a bank on March 10 for 60 days. On what date did the loan mature? 1. _____

March	21 da.
April	da.
May	da.
	60 da.

Find the number of days from:

	a		b		c	
2.	June 1 to Sept. 1	_____	May 10 to July 1	_____	Aug. 18 to Nov. 5	_____
3.	Apr. 30 to June 30	_____	Sept. 15 to Dec. 15	_____	Oct. 8 to Dec. 31	_____
4.	Mar. 15 to July 1	_____	May 10 to Aug. 1	_____	Sept. 15 to Nov. 15	_____

II. Finding Interest on Notes (175)

Find the missing numbers in the following:

	Note	Date of Note	Time	Interest	Discount	Proceeds	Date of Maturity
1.	$720	Aug. 1	45 da.	5%	_____	_____	_____
2.	$375	June 15	60 da.	6%	_____	_____	_____
3.	$1350	Oct. 20	60 da.	5%	_____	_____	_____

Instalment Buying (179)

The difference between the cash price and the instalment price is the interest charge for instalment buying.

BUY A NEW CAR
$3000 cash
$1000 down
$143 mo. for 15 mo.

1. _____ 1. Find the interest charge for buying a car on the instalment plan shown at the right.

a. Cash price = $3000

b. Instalment price = $1000 + (15 × $143)

c. Interest charge = (step **b**) − $3000

Find the interest charge:

	Article	Cash Price	Down Payment	Monthly Payment	Number of Payments	Interest Charge
2.	Television	$249	$35	$13.25	18	_____
3.	Refrigerator	$225	$60	$10.25	18	_____
4.	Vacuum cleaner	$96.50	$30	$ 9.25	8	_____
5.	Used car	$1250	$425	$74.50	12	_____
6.	New car	$2700	$900	$131.94	15	_____
7.	Bicycle	$54.95	$10.95	$5.25	9	_____

8. The difference between the amount paid back for a loan and the amount borrowed is the interest charge. A **small loan** company will make loans as shown below.

Find the interest charge.

	Amount of Loan	Monthly Payment	Number of Payments	Interest Charge
a.	$100	$8.08	15	_____
b.	$150	$14.65	12	_____
c.	$200	$36.13	6	_____
d.	$300	$23.80	15	_____

Reviewing the Fundamentals (185)

a	b	c	d	e

1. Add:

a	b	c	d	e
\$3 7.4 8 9.9 8 2 8.6 7 3.4 9 5 1.5 5	.7 3 6 .4 2 8 .5 0 0 .3 6 7	$\frac{3}{8}$ $\frac{3}{4}$ $\frac{1}{2}$	$7\frac{1}{2}$ $2\frac{5}{6}$ $8\frac{3}{4}$	9 min. 28 sec. 4 min. 55 sec. 1 min. 18 sec.

2. Subtract:

a	b	c	d	e
3 4,1 1 4 2 9,3 5 6	.4 6 5 .3 8 8	$7\frac{1}{2}$ $2\frac{5}{8}$	$14\frac{1}{2}$ $7\frac{2}{3}$	12 ft. 8 in. 8 ft. 10 in.

3. Multiply:

a	b	c	d	e
7 5 6 4 9	3.8 .7	$48\frac{3}{4}$ 7	$3\frac{1}{2} \times \frac{5}{6} =$	$2\frac{1}{2} \times 1\frac{1}{2} \times \frac{9}{10} =$

4. Divide:

a	b	c	d	e
$36\overline{)1\,1,0\,1\,7}$	$1.6\overline{)1\,2}$	$.25\overline{)1.4}$	$\frac{5}{6} \div \frac{5}{8} =$	$3\frac{1}{2} \div 2\frac{1}{4} =$

5. Find the value of:

a. $\frac{1}{2}\%$ of 1280 =

b. 48 = ____ % of 36

c. 20 = 8% of ____

Test on Unit V

Find the interest:

	Principal	Rate	Time	Interest
1.	$480	4%	6 mo.	_____
2.	$1250	3%	$1\frac{1}{2}$ yr.	_____
3.	$720	6%	$\frac{1}{2}$ yr.	_____
4.	$2275	4%	$\frac{1}{4}$ yr.	_____
5.	$360	6%	45 da.	_____
6.	$920	5%	90 da.	_____
7.	$1250	6%	30 da.	_____
8.	$2400	$4\frac{1}{2}$%	60 da.	_____

Find the rate of interest:

	Principal	Interest	Time	Rate
9.	$500	$12.50	6 mo.	_____
10.	$250	$5	4 mo.	_____
11.	$750	$10	60 da.	_____
12.	$2000	$7.50	45 da.	_____

Find the missing numbers:

	Loan	Rate	Time	Discount	Proceeds
13.	$450	6%	60 da.	_____	_____
14.	$840	4%	45 da.	_____	_____
15.	$1500	5%	30 da.	_____	_____
16.	$2750	6%	120 da.	_____	_____

Find the number of days from:

_____ **17.** June 10 to Sept. 1

_____ **18.** Mar. 15 to July 1

_____ **19.** Sept. 5 to Dec. 10

_____ **20.** Aug. 30 to Nov. 30

Unit VI. Interest and Insurance

I. Savings Accounts (192)

Find the semiannual interest on the following:

	Principal	Rate	Interest		Principal	Rate	Interest
1.	$350	2%	_____	3.	$1240	$1\frac{1}{2}\%$	_____
2.	$278	3%	_____	4.	$2530	4%	_____

5. Interest at the rate of 3% a year is equal to what semiannual rate? 5. _____
6. Interest at the rate of 2% a year is equal to what quarterly rate? 6. _____
7. The semiannual rate is $1\frac{3}{4}\%$. What is the rate per year? 7. _____

II. Simple and Compound Interest (195)

Use simple interest. Find the missing numbers:

	Prin.	Rate	Time	Interest	Amount		Prin.	Rate	Time	Interest	Amount
1.	$350	3%	2 yr.	_____	_____	3.	$750	3%	4 yr.	_____	_____
2.	$560	4%	3 yr.	_____	_____	4.	$1000	$2\frac{1}{2}\%$	3 yr.	_____	_____

5. Find the amount of $600 at 4% for 2 years when the interest is compounded annually. 5. _____

$$\begin{array}{r} \$600 \\ \times .04 \\ \hline \$24.00, \text{ int. at end of 1 yr.} \\ 600.00 \\ \hline \$624.00, \text{ prin. at end of 1 yr.} \\ \times .04 \\ \hline _____, \text{ int. at end of 2 yr.} \\ _____, \text{ prin. at end of 2 yr.} \end{array}$$

6. If interest is compounded annually, find the amount of:
(Interest is not paid on a fractional part of $1)

a. $400 at 3% for 3 yr. 6a. _____
b. $1200 at 4% for 2 yr. 6b. _____
c. $600 at 5% for 3 yr. 6c. _____

Reviewing Formulas (198)

1. _____ **1.** Find the perimeter represented in **Fig. 1.**

2. _____ **2.** Find the area represented in **Fig. 1.**

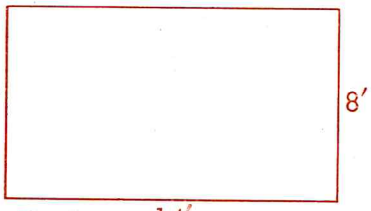


Fig. 1

3. _____ **3.** Draw a diagonal in **Fig. 1.** What is the area of each triangle formed?

4. _____ **4.** Write the formula for finding the area of **Fig. 2.**

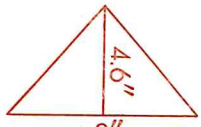


Fig. 2

5. _____ **5.** What is the area represented in **Fig. 2**?

6. _____ **6.** What kind of triangle is shown in **Fig. 3**?

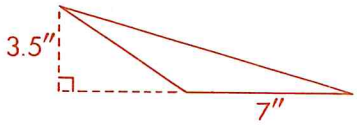


Fig. 3

7. _____ **7.** Find the area represented in **Fig. 3.**

1.	2.	3.	5.	7.

8. _____ **8.** One of the equal sides of an isosceles triangle is 4.6 feet and the base is 5.7 feet. What is the perimeter of the triangle?

9. _____ **9.** Each of two equal angles of a triangle is 72°. How many degrees are there in the third angle?

10. _____ **10.** An acute angle of a right triangle is 38°. How many degrees are there in the other acute angle?

11. _____ **11.** Write the formula for finding the area of a circle.

12. _____ **12.** A square having a side of 12 inches has an area how much greater than a circle having a diameter of 12 inches? Answer to the nearest whole number. ($\pi = 3.14$)

8.	9.	10.	12.

I. U. S. Savings Bonds (200)

For each $3 invested in U. S. Savings Bonds, Series E, the owner of the bonds will receive $4 when they mature. Thus the purchase price of a $100-bond is $75.

1. Find the purchase price of a Savings Bond which has a maturity value of:

1a. _____

1b. _____

a. $50 **c.** $200 1c. _____

b. $500 **d.** $1000 1d. _____

2. The purchase price of a Savings Bond is what per cent of the maturity value? 2. _____

3. The maturity value of a Savings Bond is what per cent of the purchase price? 3. _____

4. The cash value of a $100-Savings Bond at the end of 4 years was $82.20. What was the cash value of a $500-bond at the end of 4 years? 4. _____

5. The cash value of a $500-bond at the end of 4 years was what per cent of the maturity value? Answer to the nearest per cent. (See problem **4**) 5. _____

1.	2.	3.	4.	5.

II. Number Quickies (200)

1. What is the interest on $1000 at 3% for 2 years? 1. _____

2. The perimeter of a square is 40 inches. What is the area of the square? 2. _____

3. What is the perimeter of an equilateral triangle having a side of $3\frac{1}{2}$ inches? 3. _____

4. What number multiplied by itself has a product of 49? 4. _____

5. At an average speed of 50 m.p.h., how many hours will it take to drive 275 miles? 5. _____

6. What is the ratio of a pint to a gallon? 6. _____

7. The length of a rectangle is twice its width. The width is 5 inches. What is the area of the rectangle? 7. _____

Market Value of Stock (206)

The market value of stock is expressed as dollars with the dollar sign missing. Thus, a share of stock quoted at $12\frac{3}{4}$ sells at \$12.75.

1. Find the market value of 10 shares of stock quoted at:

a. $9\frac{1}{2}$ _____ **c.** $25\frac{1}{4}$ _____ **e.** $77\frac{1}{4}$ _____

b. $7\frac{3}{4}$ _____ **d.** $60\frac{1}{2}$ _____ **f.** $168\frac{3}{4}$ _____

2. Find the market value of 100 shares of stock quoted at:

a. 118 _____ **c.** $34\frac{1}{8}$ _____ **e.** $104\frac{3}{4}$ _____

b. $102\frac{3}{4}$ _____ **d.** $15\frac{7}{8}$ _____ **f.** $78\frac{7}{8}$ _____

3. Allow \$35 for brokerage for 100 shares of stock. Find the total cost of 100 shares of stock quoted at:

a. $92\frac{1}{2}$ _____ **c.** 100 _____ **e.** $126\frac{1}{4}$ _____

b. $105\frac{3}{4}$ _____ **d.** $149\frac{5}{8}$ _____ **f.** $201\frac{5}{8}$ _____

4. _____ **4.** Find the market value of 1000 shares of stock quoted at $2\frac{7}{8}$.

5. _____ **5.** Lucky Sam bought 100 shares of stock at $38\frac{1}{2}$. A year later he sold it at $51\frac{1}{4}$. Allow a total of \$65 for brokerage for purchasing and selling the stock. What was the net gain on the stock?

Problem Review (209)

1. The bases of a trapezoid are 15 feet and 24 feet. The altitude is 8 feet. What is the area of the trapezoid? 1. _____

2. How much fencing is needed to enclose a rectangular lot 160 feet wide and 210 feet long? 2. _____

3. What number multiplied by 16 gives a product of 240? 3. _____

4. An obtuse angle is 23° greater than a right angle. How many degrees are there in the obtuse angle? 4. _____

5. An obtuse angle is 38° less than a straight angle. How many degrees are there in the obtuse angle? 5. _____

6. What per cent of 36 is 24? 6. _____

7. A dress which cost \$7.50 was sold for \$12. The expenses were \$2.95. How much was the profit? 7. _____

8. What is the semiannual interest on \$3,400 at $2\frac{1}{2}\%$? 8. _____

9. In a certain state the legal speed limit for driving at night is 50 m.p.h. and during the day, 60 m.p.h. What is the per cent of increase in speed from night to day driving? 9. _____

10. An agent working on a 5% commission earned an average of \$150 a week. What were his average weekly sales? 10. _____

11. Find the proceeds on a note of \$250 discounted at 6% for 90 days. 11. _____

12. How many days are there from March 20 to July 1? 12. _____

Fire Insurance (212)

The annual premium for fire insurance depends upon the length of time of the policy. The rates for different times are as follows:

2 yr.—$1\frac{3}{4}$ times the yearly rate

3 yr.—$2\frac{1}{2}$ times the yearly rate

4 yr.—$3\frac{1}{4}$ times the yearly rate

5 yr.—4 times the yearly rate

1. Find the number of hundred dollars in a policy of:

a. $5000 50

b. $4500 _____

c. $3700 _____

d. $6250 _____

e. $10,500 _____

f. $22,500 _____

2. _____ **2.** The rate for a certain fire insurance policy is 18¢ per $100 for 1 year. How much could be saved on a policy of $5,000 by buying a 3-year policy instead of three 1-year policies?

3. _____ **3.** What per cent of the regular price of five 1-year policies can be saved by buying a 5-year policy?

4. Use the rates given above. Find the cost of:

4a. _____ **a.** A policy of $1000 at 24¢ per $100 for 2 years

4b. _____ **b.** A policy of $1000 at 24¢ per $100 for 3 years

4c. _____ **c.** A policy of $1000 at 24¢ per $100 for 4 years.

5. Find the premiums on the following policies at a yearly rate of 28¢ per $100: (Use the rates given above.)

a. $3500 for 3 yr. _____

b. $6500 for 2 yr. _____

c. $7500 for 4 yr. _____

d. $2750 for 1 yr. _____

e. $8000 for 2 yr. _____

f. $9800 for 3 yr. _____

I. Automobile Insurance (215)

A policy for liability insurance is issued for \$50,000-\$100,000 for personal injuries.

1. In the policy mentioned, what is the greatest amount the company will pay for bodily injury to: **a.** one person? **b.** two or more persons? 1a. _____ 1b. _____

2. The yearly premium for liability insurance on a \$5,000-\$10,000 policy is \$37.50. For 10% more the amount of the policy can be doubled. Find the yearly premium for a policy of \$10,000-\$20,000. 2. _____

3. The cost of different items of insurance for the same policy in two different companies is given. Find the yearly premium for each company. 3A. _____ 3B. _____

Item	Company A	Company B
Liability	\$26.70	\$30.59
Property damage	14.95	20.88
Fire and theft	5.60	7.14
Collision	30.10	41.75
Towing	5.00	5.50

4. A car causes property damage of \$1000. The yearly premium for insurance to cover the damage would be \$20. How many yearly policyholders at that rate would an insurance company have to have just to cover the cost of the damage? 4. _____

II. Placing the Decimal Point in the Answer (215)

Insert the decimal points to make the answers correct. (Annex zeros if necessary.)

	a	b	c
1.	$.9 \times 11 = 9\ 9$	$1.5 \times .16 = 2\ 4\ 0$	$1.7 \times 9 = 1\ 5\ 3$
2.	$1 \div .1 = 1$	$4.8 \div .04 = 1\ 2$	$.56 \div 8 = 7$
3.	$.225 \div .15 = 1\ 5$	$1.1 \times .11 = 1\ 2\ 1$	$.75 \div 15 = 5$
4.	$57.6 \div 24 = 2\ 4$	$.19 \times .19 = 3\ 6\ 1$	$.36 \div 1.8 = 2$
5.	$.7 + 3.8 = 4\ 5$	$9.2 - 8.7 = 5$	$.25 \times .25 = 6\ 2\ 5$
6.	$\frac{3}{8} = 3\ 7\ 5\%$	$\frac{1}{200} = 5\%$	$\frac{7}{8} = 8\ 7\ 5\%$

Types of Life Insurance (219)

In a certain company the yearly premium for a life insurance policy of $1000 is as follows:

Age	Straight Life	20-Payment Life	20-Year Endowment
20	$17.85	$27.48	$47.18
30	22.64	32.51	48.51
40	30.67	40.08	51.12

1. At age 20, find the annual premium for a policy of:

1a. _____ **a.** $7800 straight life.

1b. _____ **b.** $6000 20-payment life.

2. At age 30, find the annual premium for a policy of:

2a. _____ **a.** $4400 20-year endowment.

2b. _____ **b.** $12,500 straight life.

3. At age 30, how much more is the yearly premium on a policy of $8,000 if the policy is:

3a. _____ **a.** 20-year endowment instead of straight life?

3b. _____ **b.** 20-payment life instead of straight life?

4. At age 40, a man has $300 to invest in life insurance. To the nearest $500, this sum would pay the yearly premium on how much life insurance when the policy is:

4a. _____ **a.** Straight life?

4b. _____ **b.** 20-payment life?

4c. _____ **c.** 20-year endowment?

Reviewing the Fundamentals. (223)

a	b	c	d	e

1. Add:

a	b	c	d	e
37,125 408 26,375 8,459 48,996	.735 .456 .887 .968	$\frac{3}{4}$ $\frac{7}{8}$ $\frac{2}{3}$	$6\frac{1}{4}$ $4\frac{5}{6}$ $9\frac{1}{2}$	3 pt. 12 fl. oz. 1 pt. 8 fl. oz. 14 fl. oz.

2. Subtract:

a	b	c	d	e
52,421 39,568	.325 .318	$7\frac{1}{2}$ $2\frac{3}{4}$	$16\frac{2}{3}$ $9\frac{3}{4}$	12 min. 15 sec. 9 min. 38 sec.

3. Multiply:

a	b	c	d	e
496 38	7.8 4.5	56 $6\frac{3}{4}$	$\frac{5}{8}$ of 120 =	$3\frac{1}{7} \times 3\frac{1}{2} \times 4\frac{2}{3}$ =

4. Divide:

a	b	c	d	e
$37\overline{)3\,6{,}201}$	$1.6\overline{)7}$	$25\overline{)8}$	$\frac{3}{4} \div \frac{5}{6}$ =	$4\frac{1}{2} \div 1\frac{3}{4}$ =

5. Find the value of:

a. $\frac{3}{4}\%$ of \$1280 =

b. 75 = _____% of 60

c. 60 = 150% of _____

Test on Unit VI

1. Find the semiannual interest on the following:

	Principal	Rate	Interest		Principal	Rate	Interest
a.	\$620	3%	_____	**c.**	\$1940	$2\frac{1}{2}$%	_____
b.	\$1426	2%	_____	**d.**	\$2300	$3\frac{1}{2}$%	_____

2. _____ **2.** Find the amount of \$1000 at simple interest at 4% at the end of 2 years.

3. _____ **3.** Find the amount of \$1000 at compound interest at 4% at the end of 2 years. (Interest is compounded yearly.)

4. _____ **4.** The purchase price of a U. S. Savings Bond, Series E, is \$150. What will be the value of the bond at its maturity?

5. _____ **5.** Find the market value of 100 shares of stock quoted at $37\frac{3}{4}$.

6. _____ **6.** A house is insured against loss by fire for \$2,500 at a rate of 22¢ per \$100. The cost of a 3-year policy is $2\frac{1}{2}$ times the yearly cost. Find the cost of a 3-year policy.

7. _____ **7.** The cost of insuring a fur coat against loss by fire or theft per \$100 for a 3-year policy is $\$1.37\frac{1}{2}$. Find the cost to insure a fur coat for \$1000 for a 3-year period.

8. _____ **8.** At a rate of \$27.84 per \$1000 for life insurance, find the yearly premium on a policy of \$9,000.

Unit VII. Geometric Constructions and Graphs

Easy Construction (230)

1. By construction bisect angle **O**. By measurement find the number of degrees in each of the angles. 1. _____

2. By construction bisect the line **AB**. To the nearest eighth inch, by measurement find the length of a half of **AB**. 2. _____

3. At the point **P** construct an angle equal to angle **A**. By measurement find the number of degrees in each angle. 3. _____

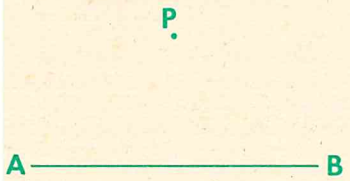


Fig. I

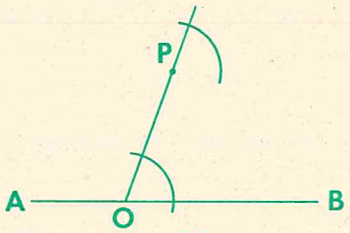


Fig. II

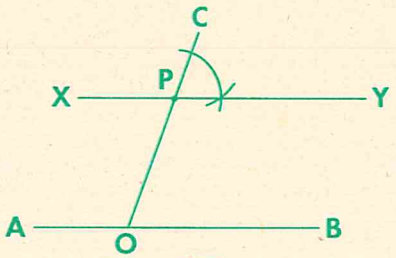


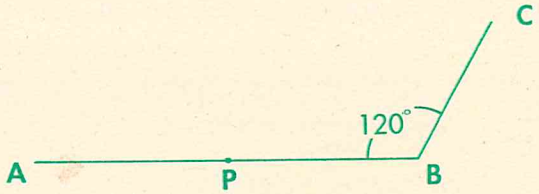
Fig. III

4. The three figures above show the steps in constructing at the point **P** a line **XY** parallel to **AB**. In Fig. III, by measurement find the number of degrees in: **a.** angle **POB**. **b.** angle **CPY**. 4a. _____ 4b. _____

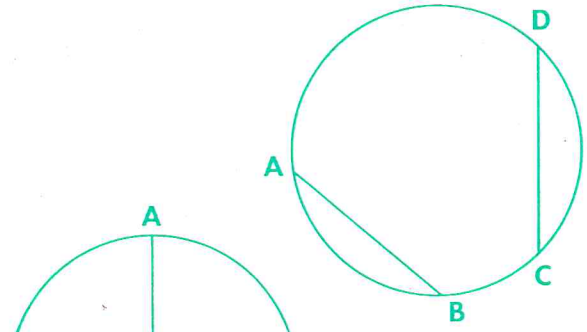
5. Through the point **O**, construct a line parallel to **MN**.

6. Let **AB** and **BC** be two sides of a parallelogram. Construct the side **AD** so that it will be parallel and equal to **BC**. Then connect **D** with **A** and **C**.

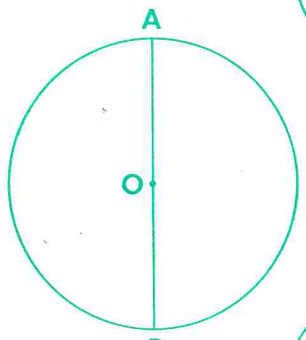
7. At the point **P** in problem **6**, construct an altitude of the parallelogram. To the nearest eighth inch, what is the length of the altitude? 7. _____



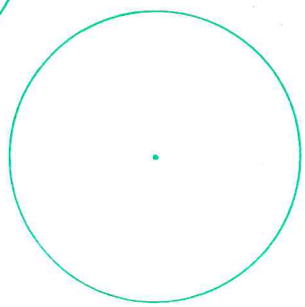
Using Constructions in Figures (233)



1. To find the center of the circle on the left, bisect at right angles the **chords AB** and **CD**. Extend the bisectors until they meet. This point of intersection is the center of the circle.



2. **AOB** is a diameter of the circle shown. Bisect at right angles this diameter with another diameter. Connect the points on the circle that form the vertices of an inscribed figure. The figure formed should be an inscribed square.



3. In the circle on the left, construct an equilateral triangle. Use the radius and mark off six equal arcs on the circle. Then connect alternate points to form an equilateral triangle.

O

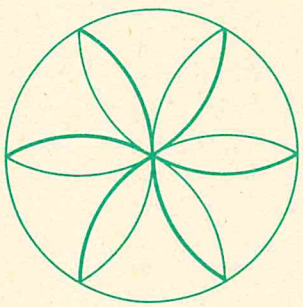
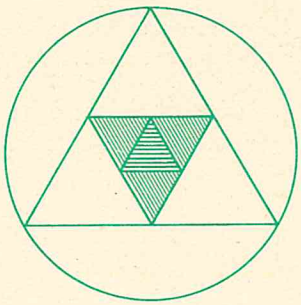
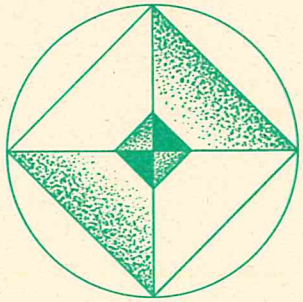
4. At the point **O** draw a circle having a radius of 1 inch. Then construct a regular inscribed hexagon. Connect each vertex of the hexagon with the center of the circle so as to form six equal triangles.

5. _____ **5.** In problem **4**, the altitude of each triangle is approximately .86 inch. The side of the triangle is 1 inch. Find the area of the hexagon.

6. _____ **6.** Use problem **5.** The area of the circle is how much more than the area of the hexagon? ($\pi = 3.14$)

7. _____ **7.** The side of an inscribed square is 1.4 inches. The radius of the circle is 1 inch. The area of the circle is how much greater than the area of the square? ($\pi = 3.14$)

I. Copying Designs (235)

Make a copy of any two of the designs shown above. Use a diameter of 2 inches.

II. Practicing Per Cents (235)

1. Express as per cents:

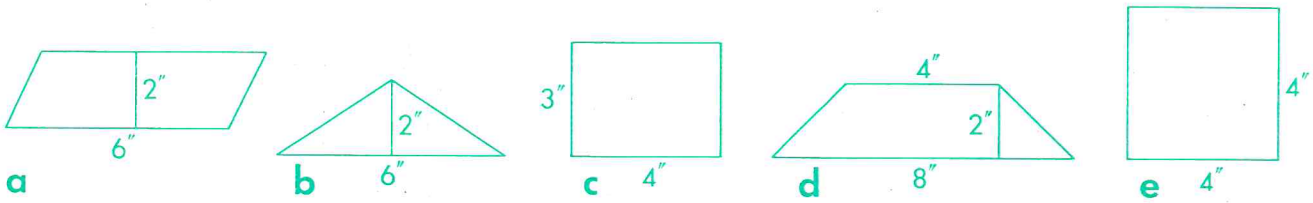
a. .2 _____ c. 2.04 _____ e. $1\frac{1}{2}$ _____ g. 2 _____

b. .035 _____ d. .465 _____ f. $\frac{2}{3}$ _____ h. 1.6 _____

Find the missing numbers:

	a	b	c
2.	3 = _____% of 10	25% of 80 = _____	15% of _____ = 120
3.	30 = _____% of 15	6% of 260 = _____	3% of _____ = 120
4.	40 = _____% of 32	103% of 480 = _____	10% of _____ = 10
5.	36 = _____% of 24	10% of 80 = _____	50% of _____ = 100

I. Equivalent Figures (237)



1. _____ 1. Write the letters of the figures shown which are equivalent.

2a. _____ 2. a. Which figure above represents the smallest area?

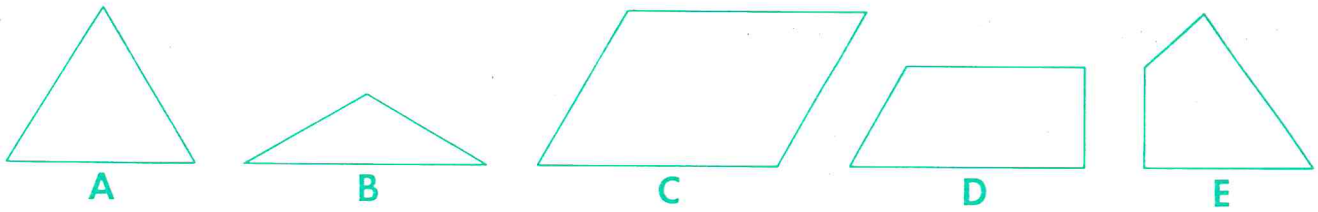
2b. _____ b. Which figure represents the largest area?

3. _____ 3. A square and a parallelogram are equivalent. The side of the square is 6 inches. The base of the parallelogram is 6 inches. What is the length of the altitude of the parallelogram?

4. _____ 4. A triangle and a square are equivalent. The side of the square is 8 feet. The base of the triangle is 8 feet. What is the length of the altitude of the triangle?

II. Symmetry (239)

In some of the figures below it is not possible to draw an axis of symmetry. In other figures at least one axis of symmetry can be drawn.



1. Use the figures above. Draw at least one axis of symmetry in the figures in which it is possible to have such an axis.

2. a. In the space below construct an equilateral triangle having a side of 2 inches. Now construct two axes of symmetry.

b. Construct a 2-inch square. Now construct at least two axes of symmetry.

I. Understanding Our Number System (242)

1. What is the value of a 4 three places to the left of ones' place? 1. _____

2. What is the value of a 4 three places to the right of ones' place? 2. _____

3. The value of the 4 on the left in 4024 is how many times the value of the 4 on the right? 3. _____

4. The value of the 4 on the left in .404 is how many times the value of the 4 on the right? 4. _____

5. Use any of the digits 1, 3, 5, and 8 but once in a number. Write the following:

   a. The largest whole number when 5 is in tens' place. 5a. _____

   b. The smallest whole number when 8 is in tens' place. 5b. _____

   c. The largest three-place decimal. 5c. _____

   d. The smallest three-place decimal when 1 is in hundredths' place. 5d. _____

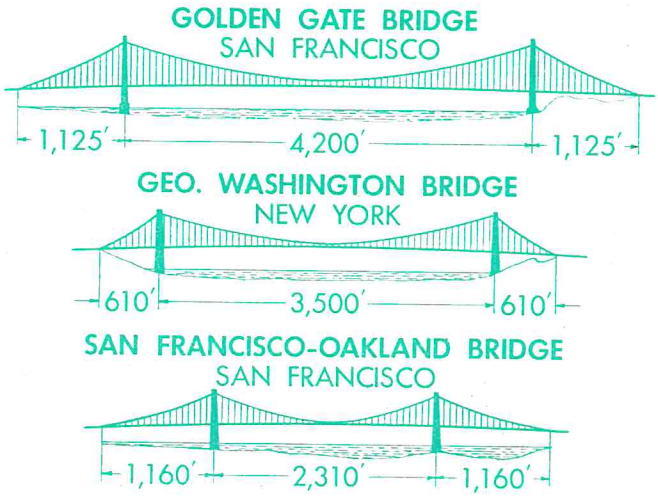
II. Finding Missing Numbers (242)

Find the missing numbers in the following:

	a	b	c	d
1.	$\begin{array}{r} 6725 \\ - \\ \hline 1839 \end{array}$	$\begin{array}{r} 125 \\ \times \\ \hline 875 \end{array}$	$32\overline{)12}$	$\begin{array}{r} \times\ 2.5 \\ \hline .625 \end{array}$
2.	$\begin{array}{r} \frac{3}{4} \\ + \\ \hline \frac{7}{8} \end{array}$	$\begin{array}{r} \\ -\ \frac{5}{6} \\ \hline 1\frac{1}{2} \end{array}$	$\frac{2}{3} \times ___ = \frac{1}{2}$	$1 \div ___ = 1\frac{1}{2}$
3.	$\begin{array}{r} 1\frac{1}{3} \\ + \\ \hline 2\frac{5}{6} \end{array}$	$\begin{array}{r} 4\frac{3}{8} \\ - \\ \hline 2\frac{5}{16} \end{array}$	$\frac{4}{5} \times ___ = \frac{2}{9}$	$\frac{7}{8} \div ___ = \frac{1}{4}$

Scale Drawing (244)

The drawings show the spans of three famous bridges and also the horizontal distances between the ends of the cables holding the bridges.



1a. _____ 1b. _____ **1. a.** What is the length of the greatest span between the piers of the bridges? **b.** What is the length of the shortest span between the piers of the bridges?

2. _____ **2.** How much greater is the span of the Golden Gate Bridge than the span of the George Washington Bridge?

3. _____ **3.** The span of the Golden Gate Bridge is what per cent greater than the span of the George Washington Bridge?

4. Find the total horizontal distance between the ends of the cables of:

4a. _____ **a.** The Golden Gate Bridge

4b. _____ **b.** The George Washington Bridge

4c. _____ **c.** The San Francisco-Oakland Bridge.

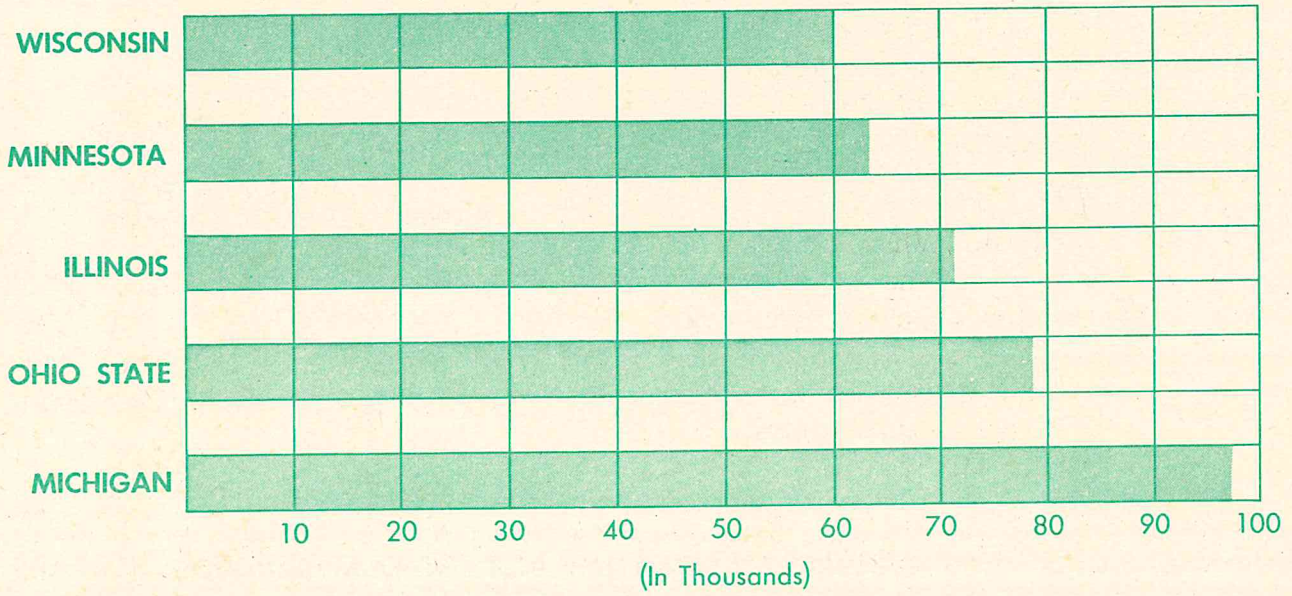
5. _____ **5.** A rectangle is drawn to a scale $1'' = 8'$. What are the dimensions of a rectangle if the drawing is $2\frac{1}{4}'' \times 3\frac{1}{8}''$?

6. Use a scale $1'' = 8'$. Make a scale drawing of a rectangle $16' \times 22'$.

7. Use a scale $1'' = 80'$. Make a scale drawing of the playing surface of a football field which is $160' \times 300'$.

8. In your drawing for problem **7**, construct a line to show the midfield on the drawing.

I. Reading Bar Graphs (246)



The graph shows the seating capacity of the football stadiums of five of the universities of the Big Ten Conference.

1. a. Which stadium has the least seating capacity? 1a. _____

   b. Estimate the number it will seat. 1b. _____

2. a. Which stadium has the greatest seating capacity? 2a. _____

   b. Estimate the number it will seat. 2b. _____

3. One of the stadiums has a seating capacity of 78,677. At which university is it located? 3. _____

4. Estimate the seating capacity of the stadium of the: 4a. _____

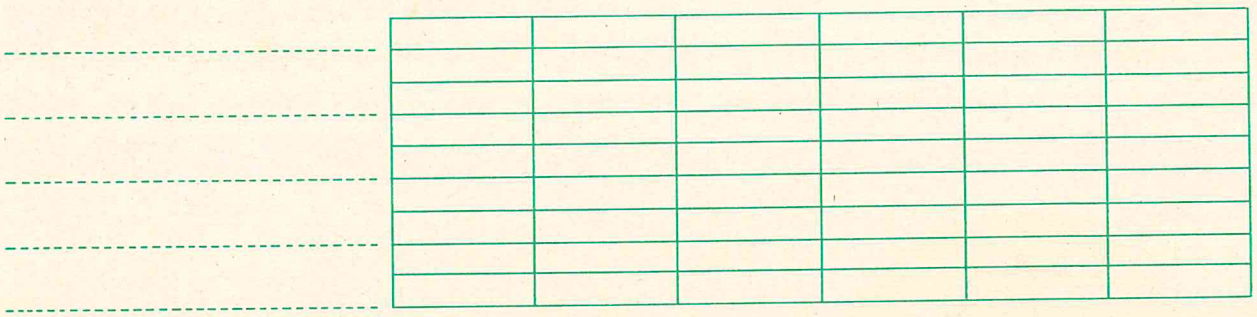
   a. University of Illinois

   b. University of Minnesota. 4b. _____

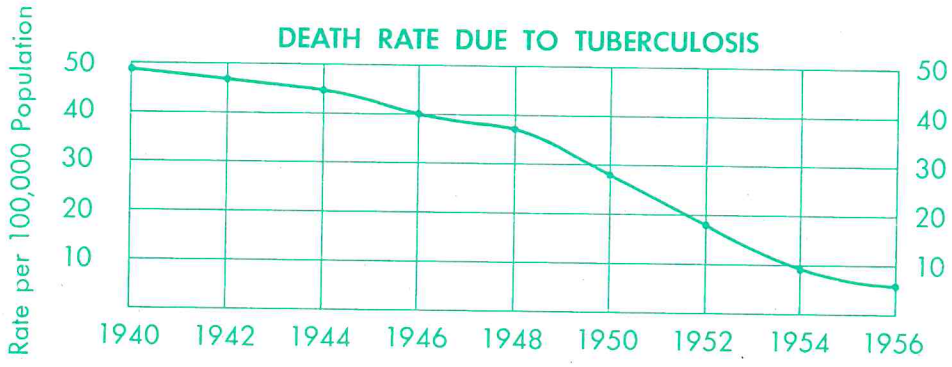
II. Drawing Bar Graphs (247)

Draw a bar graph to show the seating capacity of the other stadiums in the Big Ten Conference. The universities in this group together with the seating capacity of each stadium are:

Indiana . . 34,733	Michigan State . . 50,089
Iowa 48,813	Northwestern . . . 53,719
Purdue 52,000	



I. Reading a Line Graph (249)



The graph shows the decline in the number of deaths in this country due to tuberculosis.

1. _____ **1.** The graph represents what period of time?

2. _____ **2.** The rate is expressed in a unit of how many people?

3a. _____ **3.** Approximately what was the rate in the unit given for the:
a. first year shown?

3b. _____ **b.** last year shown?

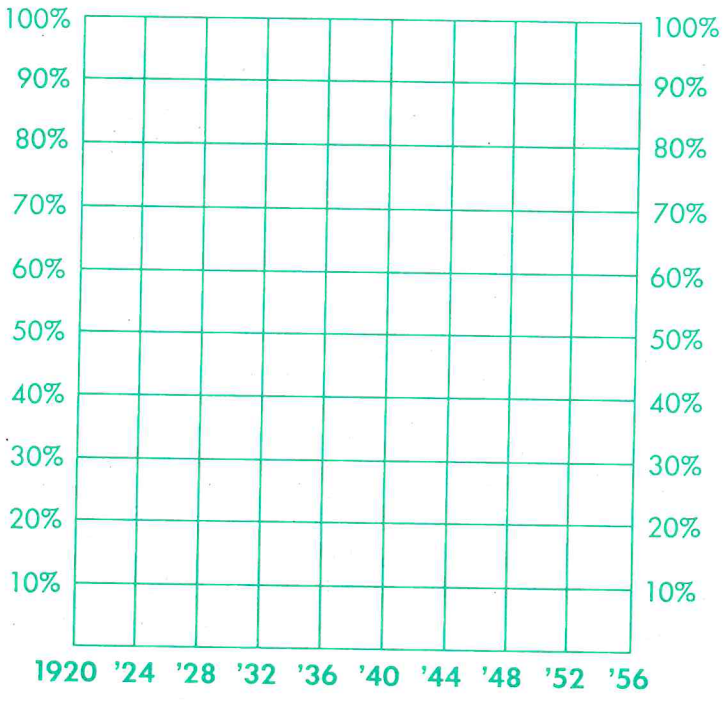
4a. _____ **4.** Give the approximate reading of the graph:
a. for 1944.

4b. _____ **b.** for 1950.

5. _____ **5.** In which year was the number of deaths per 100,000 equal to about 40?

6a. _____ **6.** For the year 1954 assume the death rate to be 9 per 100,000. At that rate, how many deaths would there be: **a.** per million population? **b.** per 100 million population?

6b. _____



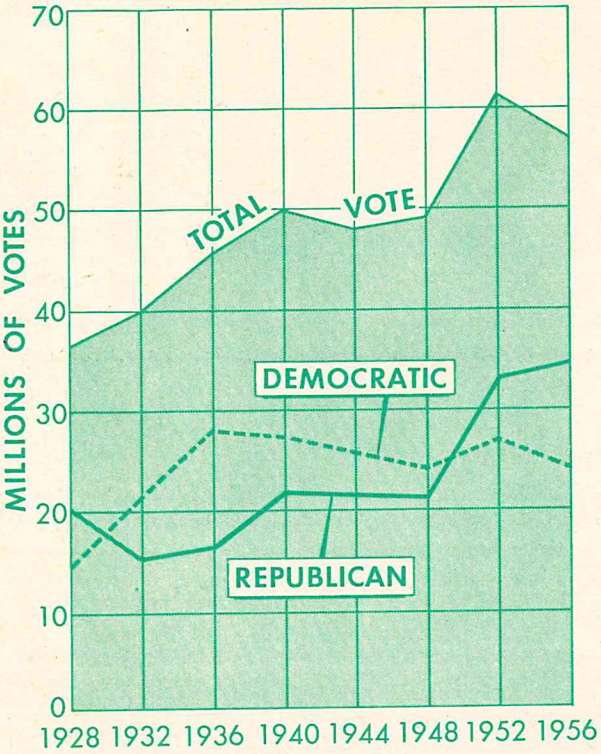
II. Drawing Line Graphs (249)

1. The table gives the per cent of electoral votes the winning candidate received for President from 1920 to 1956.

1920—77%	1940—84%
1924—72%	1944—82%
1928—83%	1948—57%
1932—88%	1952—83%
1936—98%	1956—87%

Show these facts by a line graph.

I. Reading a Line Graph Having Two Lines (250)



The graph shows the number of votes each majority party received in presidential elections from 1928 to 1956.

1. The numbers along the vertical scale are expressed in what unit? 1. _____

2. In how many of the elections shown did the: **a.** Democratic candidate win? **b.** Republican candidate win? 2a. _____ 2b. _____

3. Estimate the number of votes the Democratic candidate received: **a.** in 1936 **b.** in 1944. 3a. _____ 3b. _____

4. Estimate the number of votes the Republican candidate received: **a.** in 1932 **b.** in 1952. 4a. _____ 4b. _____

II. True or False

If a statement is true, write **T** on the blank; if false, write **F.**

1. The sum of two acute angles always is an obtuse angle. 1. _____

2. The sum of two obtuse angles must be more than a straight angle. 2. _____

3. A straight angle is equal to two right angles. 3. _____

4. The hands of a clock at 10 o'clock make an obtuse angle. 4. _____

5. The opposite sides of a parallelogram are equal. 5. _____

6. A parallelogram must have all of its angles right angles. 6. _____

7. If an obtuse angle is bisected, each angle is a right angle. 7. _____

8. The bases of a trapezoid are equal. 8. _____

9. A diagonal of a square bisects two angles of the square. 9. _____

10. If two squares have equal perimeters, the squares have equal areas. 10. _____

11. If two rectangles have equal perimeters, the rectangles have equal areas. 11. _____

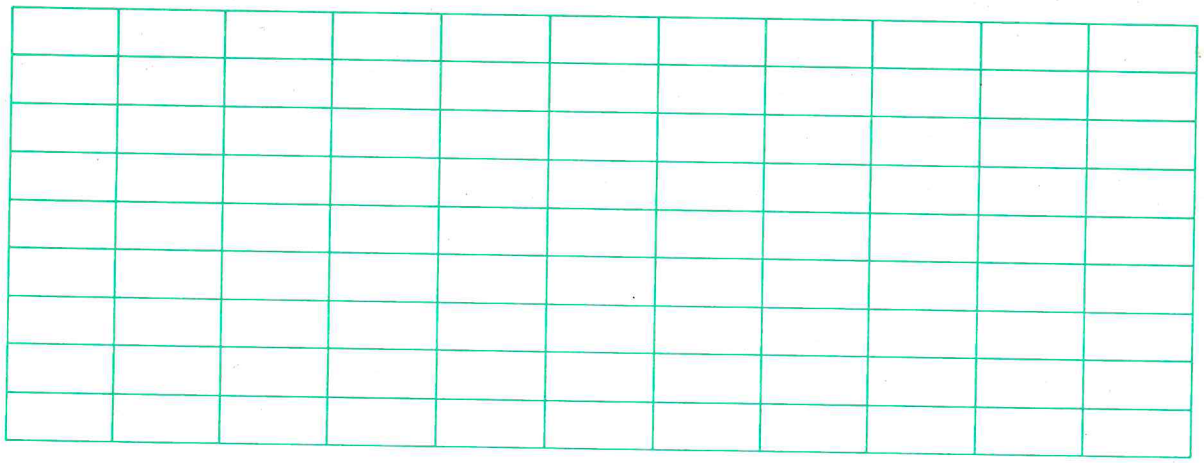
12. If two figures are equivalent, they must have equal perimeters. 12. _____

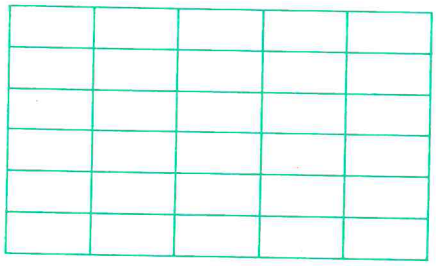
I. Drawing Line Graphs (251)

1. The average monthly temperatures of two cities, one in the southern part of the country and the other in the northern part, are as follows:

Months →	J	F	M	A	May	Ju	Jl	Aug	S	O	N	D
New Orleans	56	58	63	70	76	82	83	80	80	73	62	57
Milwaukee	23	25	34	45	55	65	72	71	64	53	38	27

Show the facts in the table by line graphs.



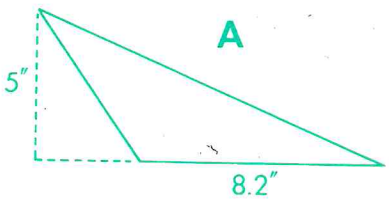


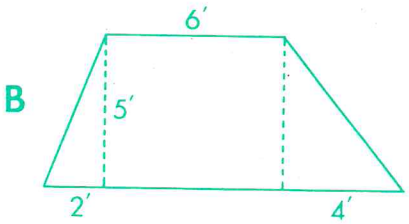
2. The table shows the speed of a car at different time intervals until it reaches a speed of at least 60 m.p.h.

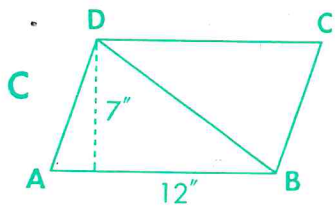
2 sec. 16 m.p.h.
4 sec. 28 m.p.h.
6 sec. 38 m.p.h.
8 sec. 47 m.p.h.
10 sec. 55 m.p.h.
12 sec. 62 m.p.h.

Show these facts by a line graph.

II. Checking on Geometry (251)







1. _____ 1. What is the area of triangle **A**?

2. _____ 2. What is the area of figure **B**?

3. _____ 3. In figure **C**, find the area of triangle **ABD**.

Practicing the Fundamentals (253)

a **b** **c** **d** **e**

1. Add:

a	b	c	d	e
$ 9.87 34.49 6.98 17.75 8.84	.475 .328 .055 .965	$\frac{5}{6}$ $\frac{3}{4}$ $\frac{1}{2}$	$7\frac{1}{2}$ $2\frac{7}{8}$ $9\frac{3}{4}$	4 hr. 38 min. 1 hr. 55 min. 48 min.

2. Subtract:

a	b	c	d	e
76,745 69,847	.375 .367	7 $2\frac{5}{8}$	$9\frac{1}{2}$ $4\frac{5}{6}$	4 pt. 9 fl. oz. 2 pt. 12 fl. oz.

3. Multiply:

a	b	c	d	e
587 8	3.75 .6	76 $9\frac{3}{4}$	$\frac{5}{8} \times 3\frac{1}{3} =$	$2\frac{1}{2} \times 3\frac{1}{4} \times 2\frac{2}{5} =$

4. Divide:

a	b	c	d	e
$180\overline{)72{,}543}$	$1.6\overline{)12}$	$1.5\overline{).96}$	$\frac{7}{8} \div \frac{3}{4} =$	$4\frac{1}{2} \div 1\frac{1}{4} =$

5. Find the value of:

a. $\frac{3}{4}\%$ of 780 =

b. 36 = _____ % of 25

c. 20 = 4% of _____

Test on Unit VII

1. By construction bisect angle **A**. By measurement find the number of degrees in each part.

1. _____

2. At the point **O**, draw a circle having a radius of $1\frac{1}{2}$ inches. Construct a regular hexagon in the circle. What is the perimeter of the hexagon?

2. _____

3. Use the figure for problem **2**. The perimeter of the hexagon is how much less than the circumference of the circle? ($\pi = 3.14$)

3. _____

4. Divide the hexagon you constructed into six equal triangles. The altitude of each triangle is 1.3 inches. (Base = radius). What is the area of the hexagon?

4. _____

5. A map is drawn to a scale of $1'' = 50$ miles. The distance between two places on the map is $4\frac{7}{8}$ inches. To the nearest mile, what is the distance between the two places?

5. _____

6. A square and a parallelogram are equivalent. The side of the square is 4 inches. The base of the parallelogram is 8 inches. What is the altitude of the parallelogram?

6. _____

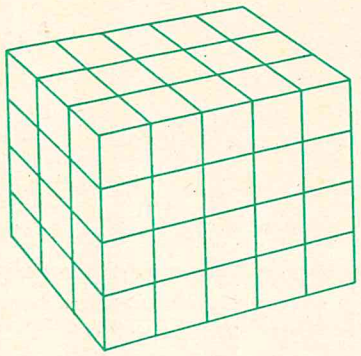
7. The greatest amount to be shown on a bar graph is 1974. If the graph is not to contain over 20 spaces, what would be a convenient scale to use to draw the graph? (1 space = ?)

7. _____

3.	4.	5.	6.	7.

Unit VIII. Solids and Volume

The Volume of a Rectangular Solid (262)



The figure shows a rectangular **solid** or **prism** which is 5 inches long, 3 inches wide, and 4 inches high.

The unit for measuring volume or capacity is a cube.

1. Find the volume of a rectangular bin 6 feet long, 3 feet wide, and 5 feet deep, or high. **1.** _____

$V = lhw$, the formula

$V = 6 \times 3 \times 5 = ?$

Find the volumes of the following rectangular solids:

	Length	Width	Height	Volume		Length	Width	Height	Volume
2.	8 ft.	2 ft.	5 ft.	_____	**5.**	$6\frac{1}{2}$ ft.	$3\frac{1}{2}$ ft.	12 ft.	_____
3.	14 in.	9 in.	8 in.	_____	**6.**	$3\frac{1}{2}$ yd.	8 yd.	$\frac{1}{2}$ yd.	_____
4.	5.6 ft.	4 ft.	3.5 ft.	_____	**7.**	75 cm.	30 cm.	50 cm.	_____

2.	**3.**	**4.**	**5.**	**6.**	**7.**

8. Certain berry crates have the following dimensions. Find their volumes in cubic inches:

a. $2\frac{1}{2}'' \times 13\frac{3}{4}'' \times 18'' =$ _____

b. $5\frac{3}{4}'' \times 16\frac{1}{2}'' \times 24'' =$ _____

c. $6'' \times 13\frac{3}{4}'' \times 19\frac{1}{2}'' =$ _____

d. $7\frac{3}{4}'' \times 15\frac{1}{2}'' \times 22'' =$ _____

a.	**b.**	**c.**	**d.**

The Volume of a Cube (266)

1. _____ **1.** Find the volume of a 3-inch cube. $V = 3 \times 3 \times 3 = ?$

2. Find the volumes of cubes whose edges are:

a. 2 in._____ **c.** 1 in._____ **e.** 4 cm._____ **g.** 10 cm._____

b. 5 in._____ **d.** 6 in._____ **f.** 8 cm._____ **h.** .1 ft. _____

3. _____ **3.** How many cubic inches are there in a cubic foot?

4. _____ **4.** How many cubic feet are there in a cubic yard?

5. _____ **5.** Since there are 100 centimeters in a meter, how many cubic centimeters are there in a cubic meter?

6. _____ **6.** How many square inches are there in a cube 3 inches on a side? (Think: There are six equal sides or faces on a cube.)

7a. _____ **7. a.** How many square inches are there in a cube 6 inches on a side?

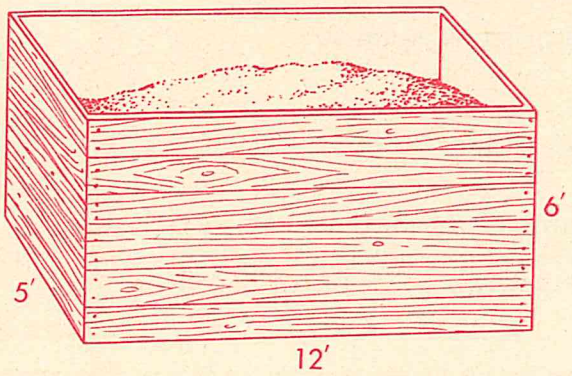
7b. _____ **b.** How many square inches are there in a cube 12 inches on a side?

3.	4.	5.	6.	7.

8. _____ **8.** A cubic foot of water weighs 62.4 pounds. Assume 7.5 gallons per cubic foot. To the nearest tenth of a pound, what is the weight of a gallon of water?

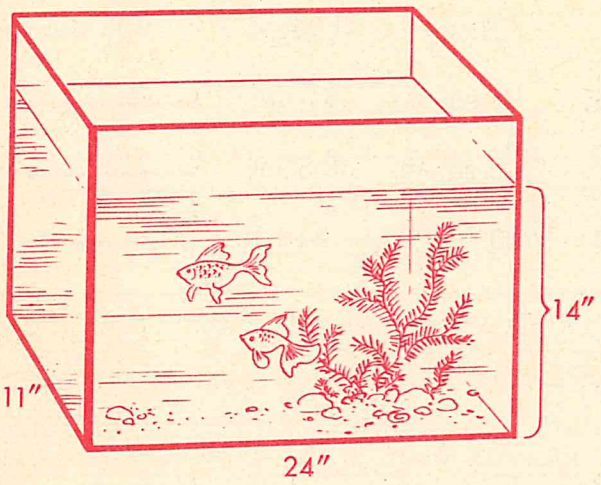
9. _____ **9.** A gallon of sea water (salt water) weighs 64 pounds per cubic foot. To the nearest tenth of a pound, what is the weight of a gallon of sea water?

Applications of Volumes of Prisms (267)



1. The diagram shows a bin for storing wheat. How many cubic feet does the bin contain? 1. _____

2. Allow .8 bushel per cubic foot in problem **1**. How many bushels will the bin contain when level full? 2. _____



3. Allow 231 cubic inches per gallon. How many gallons does the aquarium contain? 3. _____

4. A gallon is equal to 231 cubic inches. To the nearest cubic inch, how many cubic inches are there in a quart? 4. _____

5. An excavation for an oil tank was 12 feet long, $4\frac{1}{2}$ feet wide, and 6 feet deep. How many cubic yards of earth were removed? 5. _____

1.	2.	3.	4.	5.

6. A marble slab is $6' \times 3' \times \frac{1}{2}'$. Allow 180 pounds per cubic foot. What is the weight of the slab? 6. _____

7. The standard packing boxes for citrus fruits have the following inside dimensions. Find the cubic content of each.

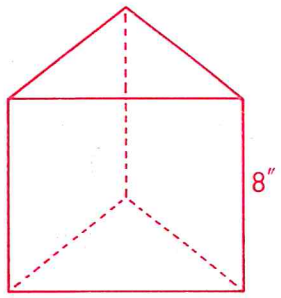
a. Florida and Texas oranges: $12'' \times 12'' \times 24''$ 7a. _____

b. California and Oregon oranges: $11\frac{1}{2}'' \times 11\frac{1}{2}'' \times 24''$ 7b. _____

c. California Jumbo oranges: $11\frac{1}{2}'' \times 13\frac{1}{2}'' \times 24''$ 7c. _____

I. Finding Volume When Area of Base Is Given (268)

If the area of the base is known, the volume of a prism is equal to the product of the base and the altitude.



1. _____ **1.** Write the formula for the volume.

2. _____ **2.** In the figure shown, the area of the base is 12 square inches. What is the volume of the prism?

Find the volumes of prisms having dimensions of:

	Base	Height	Volume
3.	48 sq. in.	9 in.	_____
4.	56 sq. ft.	6 ft.	_____
5.	144 sq. in.	8 in	_____

	Base	Height	Volume
6.	96 sq. in.	$8\frac{1}{2}$ in.	_____
7.	21.6 sq. in.	8.5 in.	_____
8.	720 sq. cm.	24 cm.	_____

II. Finding Specific Gravity (268)

The **specific gravity** of a substance is the ratio of its weight to the weight of a like volume of water. The specific gravity of pine wood is 0.5. This means that a cubic foot of pine weighs only half as much as a cubic foot of water.

The weight of a cubic foot of water is 62.4 pounds. To the nearest pound, find the missing numbers:

	Substance	Specific Gravity	Weight per cu. ft.
1.	Aluminum	2.7	_____
2.	Cork	0.25	_____
3.	Ice	0.92	_____

	Substance	Specific Gravity	Weight per cu. ft.
4.	Iron	7.9	_____
5.	Lead	11.3	_____
6.	Oak	0.8	_____

I. Number Quickies (269)

1. There are how many centimeters in 1.6 meters? 1. _____

2. What is the volume of a 4-inch cube? 2. _____

3. What is the area of a 4-inch cube? 3. _____

4. Three quarts are what per cent of a gallon? 4. _____

5. The cost of a taxi fare is 50¢ for the first mile and 10¢ for each additional $\frac{1}{4}$ mile. Find the taxi fare for a trip of 2 miles. 5. _____

6. What is the perimeter of an equilateral triangle having a side of 15 inches? 6. _____

7. What kind of angle do the hands of a clock make at 4 o'clock? 7. _____

8. An acute angle of a right triangle is 50°. How many degrees are there in the other acute angle? 8. _____

9. There are how many watts in 3.7 kilowatts? 9. _____

10. A square having a side of 6 inches is equivalent to a rectangle 9 inches long. What is the width of the rectangle? 10. _____

II. Magic Squares (269)

In the squares **A** and **B** below, write the missing numbers so as to make each square a magic square.

A

$1\frac{1}{3}$	$\frac{1}{6}$	$\frac{1}{4}$	
	$\frac{11}{12}$		$\frac{2}{3}$
$\frac{3}{4}$		$\frac{1}{2}$	
$\frac{1}{3}$	$1\frac{1}{6}$	$1\frac{1}{4}$	$\frac{1}{12}$

B

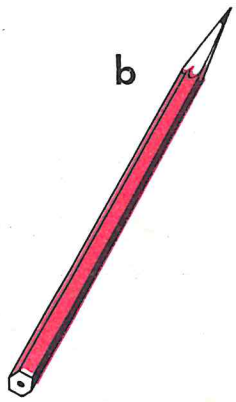
4.8	0.6		3.9
	3.3		2.4
	2.1	1.8	3.6
1.2	4.2	4.5	

1. What is the sum of the numbers in a row or a column in Square **A**? 1. _____

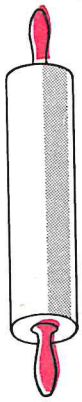
2. What is the sum of the numbers in a row or a column in Square **B**? 2. _____

Finding the Volume of a Cylinder (270)

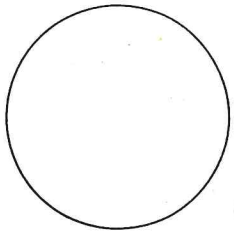
a



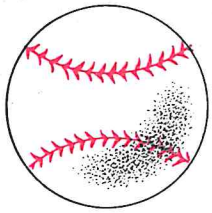
b



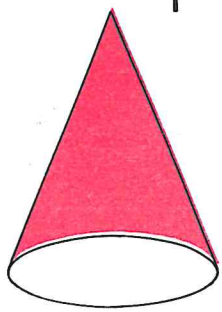
c



d



e



f

1. _____ **1.** Which of the above figures represents a cylinder?

2a. _____ **2. a.** The base of a cylinder is what kind of figure?

2b. _____ **b.** What is the formula for the area of this figure?

2c. _____ **c.** Write the formula for the volume of a cylinder.

3. _____ **3.** Find the volume of a cylinder having a diameter of 6 inches and a height of 8 inches. $V = 3.14 \times 3 \times 3 \times 8 = ?$

Find the volume of cylinders having the following dimensions: ($\pi = 3.14$)

	Diameter	Height	Volume
4.	4 in.	10 in.	_____
5.	2 ft.	12 ft.	_____
6.	1 ft.	10 ft.	_____

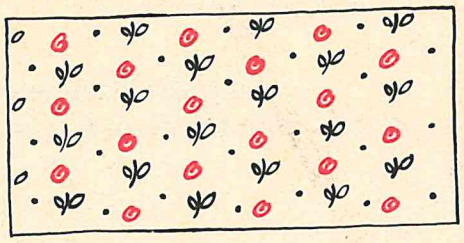
	Diameter	Height	Volume
7.	9.6 in.	30 in.	_____
8.	0.8 ft.	20 ft.	_____
9.	30 cm.	80 cm.	_____

10. _____ **10.** A cylindrical tank has a diameter of 28 inches and a height of 55 inches. Allow 231 cubic inches per gallon. How many gallons will the tank hold when filled? ($\pi = 3\frac{1}{7}$)

11. _____ **11.** A fuel oil tank has a diameter of 4 feet and a height of 9 feet. Allow $7\frac{1}{2}$ gallons per cubic foot. To the nearest gallon, how many gallons will the tank hold when filled? ($\pi = 3.14$)

Finding the Area of a Cylinder (272)

a



b

1. Kathy is putting a new cover design around her knitting bag. What is the shape of the paper for covering the lateral (side) area of the bag? 1. _____

2. The bag has a diameter of 6 inches and a height of 9 inches. What is the lateral area of the bag? 2. _____

$$A = 3.14 \times 6 \times 9 = ?$$

Find the lateral area of cylinders having dimensions of:

($\pi = 3.14$)

	Diameter	Height	Area
3.	8 in.	12 in.	_____
4.	2 ft.	8 ft.	_____

($\pi = 3\frac{1}{7}$)

	Diameter	Height	Area
5.	14 in.	45 in.	_____
6.	7 in.	24 in.	_____
7.	18 in.	72 in.	_____
8.	1 ft.	7.5 ft.	_____
9.	35 cm.	120 cm.	_____
10.	28 cm.	95 cm.	_____

11. A lawn roller is 28 inches in diameter and 48 inches wide. How much surface is rolled when the roller makes one revolution? ($\pi = 3\frac{1}{7}$) 11. _____

Finding the Volume of a Pyramid (274)

1. _____ **1.** Write the formula for the volume of a pyramid in which B is the area of the base.

2. _____ **2.** Find the volume of a pyramid having a base of 64 square inches and an altitude of 6 inches.

$$V = \frac{1}{3} \times 64 \times 6 = ?$$

Find the volume of the following pyramids:

	Base	Height	Volume		Base	Height	Volume
3.	42 sq. in.	8 in.	_____	**5.**	18.5 sq. in.	4 in.	_____
4.	36 sq. ft.	9 ft.	_____	**6.**	56.2 sq. ft.	7.5 ft.	_____
7.	72 sq. ft.	$6\frac{1}{2}$ ft.	_____	**9.**	240 sq. cm.	48 cm.	_____
8.	120 sq. ft.	$8\frac{1}{4}$ ft.	_____	**10.**	1250 sq. cm.	45 cm.	_____

11. _____ **11.** A pyramid has a square base of 6 inches on a side and an altitude of 8.5 inches. What is the volume of the pyramid?

12. _____ **12.** A granite monument in the shape of a pyramid has a square base 2 feet on a side and an altitude of 7.5 feet. Allow 180 pounds per cubic foot. Find the weight of the monument.

Finding the Volume of a Cone (275)

1. Write the formula for the volume of a cone in which B is the area of the base. 1. _____

2. What kind of figure is the base of a cone? 2. _____

3. What is the formula for the area of a circle? 3. _____

4. Find the volume of a cone 8 inches in diameter and 6 inches high. 4. _____

$V = \frac{1}{3} \pi r^2 h$, the formula

$V = \frac{1}{3} \times 3.14 \times 4 \times 4 \times 6 = ?$

Find the volume of cones having dimensions of:

	($\pi = 3.14$)				($\pi = 3\frac{1}{7}$)		
	Diameter	Height	Volume		Radius	Height	Volume
5.	6 in.	12 in.	_____	7.	14 in.	15 in.	_____
6.	12 ft.	5 ft.	_____	8.	7 ft.	10 ft.	_____
9.	10 ft.	9 ft.	_____	11.	35 cm.	30 cm.	_____
10.	16 ft.	6 ft.	_____	12.	56 cm.	45 cm.	_____

I. The 24-Hour Clock (280)

Time on a 24-hour clock is expressed as a four-place number without any punctuation.

1. Express the following as times on a 24-hour clock:

a. 1:45 a.m. 0145
b. 2:10 p.m. _____
c. 6:15 a.m. _____
d. 10:10 a.m. _____
e. 9:01 a.m. _____
f. 9:01 p.m. _____
g. 5:00 p.m. _____
h. 11:56 a.m. _____
i. Midnight _____

2. Express the following as times on a 12-hour clock:

a. 1640 4:40 p.m.
b. 0317 _____
c. 1116 _____
d. 0545 _____
e. 2340 _____
f. 1727 _____
g. 2020 _____
h. 0141 _____
i. 2400 _____

II. A Matching Test (280)

Column I contains formulas and Column II contains the names of formulas. Write the number of the formula from Column I on the correct blank in Column II.

Column I	Column II	
1. $C = \pi d$	a. 2	Area of a circle
2. $A = \pi r^2$	b. _____	Area of a parallelogram
3. $V = lwh$	c. _____	Area of a rectangle
4. $V = e^3$	d. _____	Area of a square
5. $p = 4s$	e. _____	Area of a trapezoid
6. $V = \pi r^2 h$	f. _____	Area of a triangle
7. $A = lw$	g. _____	Circumference of a circle
8. $A = \frac{1}{2} h (a + b)$	h. _____	Perimeter of a rectangle
9. $A = s^2$	i. _____	Perimeter of a square
10. $A = bh$	j. _____	Volume of a cube
11. $p = 2l + 2w$	k. _____	Volume of a cylinder
12. $A = \frac{1}{2} bh$	l. _____	Volume of a rectangular prism

Measuring Lumber (282)

1. Find the number of board feet in a board 12 feet long, 6 inches wide, and $1\frac{1}{4}$ inches thick. **1.** _____

No. of bd. ft. $= 12 \times \frac{1}{2} \times 1\frac{1}{4} = ?$

Find the missing numbers:

	Length	Width	Thickness	Board Feet
2.	12 ft.	6 in.	1 in.	_____
3.	14 ft.	10 in.	$\frac{7}{8}$ in.	_____
4.	18 ft.	15 in.	1 in.	_____
5.	16 ft.	4 in.	4 in.	_____
6.	16 ft.	4 in.	2 in.	_____
7.	18 ft.	8 in.	2 in.	_____
8.	12 ft.	4 in.	$\frac{3}{8}$ in.	_____
9.	18 ft.	6 in.	2 in.	_____
10.	16 ft.	9 in.	$1\frac{1}{2}$ in.	_____
11.	8 ft.	6 in.	6 in.	_____
12.	12 ft.	4 in.	$\frac{3}{4}$ in.	_____
13.	20 ft.	4 in.	2 in.	_____

14. Allow 48 pounds per cubic foot for oak. Find the weight of a cord of oak. (128 cu. ft. = 1 cord) **14.** _____

Applications of Measures of Area and Volume (285)

1. _____ **1.** The dimensions of a rectangular piece of ice are $3' \times 2' \times 6''$. How many cubic feet are in the piece of ice?

2. _____ **2.** Use problem **1.** Allow 57 pounds per cubic foot. Find the weight of the ice.

3. _____ **3.** A coal bin is 25 feet long, 9 feet wide, and 14 feet deep. (Inside dimensions.) Allow 35 cubic feet per ton of hard coal. How many tons of hard coal will the bin hold when level full?

4. _____ **4.** The inside dimensions of a silo are as follows: height, 28 feet; diameter, 10 feet. How many cubic feet of silage will the silo hold when filled level full? ($\pi = 3\frac{1}{7}$)

1.	2.	3.	4.

5. _____ **5.** The outside dimensions of a silo are as follows: height, 25 feet, diameter, 12 feet. Find the number of square feet in the surface of the silo. ($\pi = 3.14$)

6. _____ **6.** A cylindrical hot water tank 14 inches in diameter is 45 inches high. Allow 231 cubic inches per gallon. How many gallons of water will the tank hold when filled? ($\pi = 3\frac{1}{7}$)

7. _____ **7.** A cube has an edge of 6 inches. What is the area of the cube?

8. _____ **8.** The base of a pyramid is a square 2 feet on a side. The height of the pyramid is 5 feet. What is the volume of the pyramid?

5.	6.	7.	8.

Practicing the Fundamentals (286)

	a	b	c	d	e
. Add:	$7 4.8 7 9.9 8 6 1.5 5 8.4 9 5 7.5 0	.3 7 5 .4 6 8 .7 7 4 .6 5 7	$\frac{3}{4}$ $\frac{7}{8}$ $\frac{5}{16}$	$1\frac{2}{3}$ $7\frac{3}{4}$ $6\frac{1}{2}$	7 lb. 9 oz. 3 lb. 14 oz. 4 lb. 12 oz.
2. Subtract:	7 2,4 6 7 5 8,8 7 9	.6 2 5 .3 8 7	1 7 $9\frac{5}{8}$	$6\frac{1}{4}$ $4\frac{2}{3}$	14 min. 12 sec. 9 min. 45 sec.
3. Multiply:	8 7 6 4 7	1 6.5 .9	$8\ 7\frac{3}{4}$ 6	$\frac{7}{8} \times 86 =$	$\frac{3}{4} \times \frac{5}{6} \times 1\frac{1}{2} =$
4. Divide:	$27\overline{)1\ 3,7\ 1\ 4}$	$.25\overline{)4}$	$1.2\overline{).1\ 5}$	$72 \div \frac{4}{9} =$	$2\frac{5}{8} \div 3 =$

5. Find the value of:

a. $\frac{3}{4}\%$ of 1680 =

b. 36 = _____% of 25

c. 8% of _____ = 40

Test on Unit VIII

Find the volume of:

1. _____ 1. A rectangular prism when $l = 8'$, w $= 1\frac{1}{2}'$, and h $= 3\frac{1}{2}'$.

2. _____ 2. A cube having an edge of 15 inches.

3. _____ 3. A cylinder having a diameter of 21 inches and a height of 40 inches. $(\pi = 3\frac{1}{7})$

4. _____ 4. A pyramid having a square base 6 inches on a side and an altitude of 10 inches.

1.	2.	3.	4.

5. _____ 5. The inside dimensions of a bin are $12' \times 6' \times 8'$. Allow .8 bushel per cubic foot. How many bushels of wheat will the bin hold when level full?

6. _____ 6. A cube has an edge of 12 inches. Find the surface area of the cube.

7. _____ 7. An aquarium 33 inches long and 12 inches wide is filled with water to a depth of 14 inches. Allow 231 cubic inches per gallon. How many gallons of water does the aquarium contain?

8. _____ 8. The dimensions of a piece of ice are $24'' \times 18'' \times 8''$. Allow 57 pounds per cubic foot. What is the weight of the ice?

5.	6.	7.	8.

Unit IX. Cost of Government—Taxes

The Tax Rate (293)

1. The assessed valuation of a town is $4,000,000. The amount to be raised by taxation is $180,000. What is the tax rate in per cent? 1. _____

$$\frac{\$180{,}000}{\$4{,}000{,}000} = \frac{18}{400} = \frac{9}{200} \qquad 200\overline{)9.000}$$

2. Express the following as per cents:

a. $\frac{3{,}000}{75{,}000} =$ b. $\frac{25{,}000}{200{,}000} =$ c. $\frac{400{,}000}{2{,}500{,}000} =$

Express as per cents the following tax rates:

	Amount of Budget	Assessed Valuation	Tax Rate
3.	$200,000	$5,000,000	_____
4.	$400,000	$8,000,000	_____
5.	$450,000	$10,000,000	_____
6.	$750,000	$25,000,000	_____
7.	$330,000	$5,500,000	_____
8.	$470,000	$10,000,000	_____
9.	$1,200,000	$24,000,000	_____
10.	$720,000	$15,000,000	_____

I. Expressing Tax Rates in Different Ways (294)

A tax rate of 4.5% is the same as \$4.50 per \$100 of assessed valuation, or \$45 per \$1000.

Write the missing numbers for tax rates expressed as:

	A per cent	Per \$100	Per \$1000		A per cent	Per \$100	Per \$1000
1.	3.7%	_____	_____	4.	_____	_____	\$61.00
2.	4.96%	_____	_____	5.	_____	_____	\$57.40
3.	_____	\$5.20	_____	6.	_____	\$3.88	_____

7. _____ 7. A mill is one-tenth of a cent. There are how many mills in a dollar?

8. _____ 8. A tax rate of 4.5% is equal to how many cents on \$1 of assessed valuation?

9. A tax rate of 4.5% is the same as 45 mills on \$1 of assessed valuation. Express as mills on the dollar:

9a. _____ a. A rate of 3.9%

9b. _____ b. A rate of 5.3¢ on \$1

9c. _____ c. A rate of \$4.80 on \$100.

10. _____ 10. Express a rate of 52 mills on the dollar as a per cent.

II. Changing to Different Units (294)

Find the missing numbers in the following:

	a		b	
1.	3 gal.	= _____ pt.	72 in.	= _____ yd.
2.	32 oz.	= _____ lb.	4 cm.	= _____ mm.
3.	64 fl. oz.	= _____ qt.	1.2 kw.	= _____ w.
4.	1.2 hr.	= _____ min.	90 sec.	= _____ min.
5.	60 mills	= _____ ¢	12 pt.	= _____ gal.
6.	.75 m.	= _____ cm.	$1\frac{3}{4}$ lb.	= _____ oz.
7.	1.5 T.	= _____ lb.	1 cu. ft.	= _____ cu. in.

Finding Property Taxes (294)

To the nearest cent, find the taxes in the following:

	Assessed Valuation	Tax Rate	Amount of Tax
1.	$3100	3.7%	
2.	$4250	4.6%	
3.	$5500	$4.68 per $100	
4.	$7200	$5.36 per $100	

1.	2.	3.	4.

	Assessed Valuation	Tax Rate	Amount of Tax
5.	$5875	4.7%	
6.	$7750	5.8%	
7.	$9240	$6.40 per $100	
8.	$8850	$6.75 per $100	

5.	6.	7.	8.

9. A house was sold for $15,000. It was assessed at $9,000. The assessed valuation was what per cent of the sale price? 9. _____

10. A property having a value of $17,500 is assessed at 80% of its value. The tax rate is $5.28 per $100 of assessed valuation. What are the yearly taxes on the property? 10. _____

11. Mr. Burton pays his taxes quarterly on property assessed at $7,800. If the tax is $56 per $1000 of assessed valuation, what is the quarterly tax? 11. _____

9.	10.	11.

Gasoline Tax (296)

There is both a federal and state tax on gasoline used to operate motor vehicles on highways.

To the nearest cent, find the missing numbers:

	Gallons purchased	Price per gal. without tax	Federal tax per gal.	State tax per gal.	Total tax on purchase	Total cost of purchase
1.	10	21.8¢	3¢	4¢		
2.	16	24.6¢	3¢	$5\frac{1}{2}$¢		
3.	12	22.7¢	3¢	6¢		
4.	24	21.4¢	3¢	$4\frac{1}{2}$¢		
5.	18	25.2¢	3¢	7¢		

1.	2.	3.	4.	5.

6. _____ **6.** A car was driven 7,800 miles in a year. At an average of 16 miles per gallon, find the number of gallons used in driving this distance.

7. _____ **7.** Allow an average of 490 gallons of gasoline per driver of a car. Find the cost of the gasoline at an average of 22.8¢ per gallon plus a tax of $8\frac{1}{2}$¢ per gallon.

8. The price of gasoline plus tax is 30¢ a gallon. If the federal tax is 3¢ a gallon and the state tax is 7¢ a gallon:

8a. _____ **a.** The federal tax is what per cent of the cost of the gasoline without tax?

8b. _____ **b.** The state tax is what per cent of the cost of the gasoline without tax?

9a. _____ **9.** In problem **8**, the total tax is what per cent of the cost of the gasoline: **a.** without tax?

9b. _____ **b.** with tax?

6.	7.	8.	9.

I. Understanding the Number System (298)

1. What is the value of the digit 8 four places to the left of ones' place? 1. _____

2. What is the value of the digit 8 three places to the right of ones' place? 2. _____

3. What is the missing digit in the number 44__8 so that the number will be divisible by 9? 3. _____

4. In the number, 5.15, the value of the 5 on the left is how many times the value of the 5 on the right? 4. _____

5. Use each of the digits 1, 2, 5 only once in a number. Then write: **a.** The largest whole number in which 5 is in tens' place 5a. _____

b. The smallest three-place decimal. 5b. _____

c. The largest three-place decimal which is less than .5. 5c. _____

6. Think of the largest one-place decimal. Write the number which has a value twice as great. 6. _____

II. Working with Per Cents (298)

Find the missing numbers:

	a	b	c
1.	50% of 80 = _____	10 = _____% of 40	90 = 40% of _____
2.	110% of 85 = _____	31 = _____% of 25	30 = 25% of _____
3.	$\frac{1}{2}$% of 740 = _____	124 = _____% of 80	18 = 12% of _____
4.	3.7% of \$460 = _____	75 = _____% of 40	300 = 120% of _____
5.	103% of 850 = _____	20% more than 48 =	30% less than 65 =

Other Types of Taxes (302)

There is a federal tax on many articles sold in this country. About two-thirds of the states have a sales' tax on certain articles.

To the nearest cent, find the missing numbers:

		Rate of federal tax	Amount of federal tax	Rate of sales' tax	Amount of sales' tax	Total cost of article
1.	Movie ticket, 60¢	10%	_____	None	None	_____
2.	Costume jewelry, $7.50	10%	_____	3%	_____	_____
3.	Luggage, $27.50	10%	_____	2%	_____	_____
4.	Dress, $24.50	None	None	3%	_____	_____
5.	Bus ticket, $3.60	10%	_____	None	None	_____

1.	2.	3.	4.	5.

6. The cost of a watch including a 10% federal tax is $71.50. What is the cost of the watch without tax? (The total cost is 110% of the cost without the tax.)

6. _____

7. The cost of a ticket to a baseball game is $1.65. If the cost includes a 10% tax, what is the cost of the ticket without tax?

7. _____

8. A mink fur piece cost $675 without tax. There is a 10% federal tax and a 3% sales' tax on the fur. Find the total cost to the purchaser.

8. _____

9. Find the cost of a diamond ring marked at $199.50 plus a 10% federal tax and a 2% sales' tax.

9. _____

6.	7.	8.	9.

Practicing the Fundamentals (307)

a	b	c	d	e

1. Add:

a	b	c	d	e
94 736 87 2319 458	4.6 8.7 5.8 7.5	$\frac{3}{4}$ $\frac{7}{8}$ $\frac{1}{2}$	$2\frac{5}{6}$ $8\frac{3}{4}$ $4\frac{1}{2}$	16 min. 27 sec. 9 min. 45 sec. 32 sec.

2. Subtract:

a	b	c	d	e
74,382 68,776	.045 .038	$7\frac{1}{2}$ $2\frac{3}{4}$	$8\frac{1}{4}$ $5\frac{2}{3}$	12 lb. 4 oz. 7 lb. 12 oz.

3. Multiply:

a	b	c	d	e
768 47	.75 3.4	87 $6\frac{3}{4}$	$\frac{4}{5}$ of 120 =	$1\frac{3}{4} \times \frac{7}{8} \times 3\frac{1}{7}$ =

4. Divide:

a	b	c	d	e
$16\overline{)8144}$	$2.5\overline{)11}$	$.36\overline{)21.6}$	$\frac{3}{4} \div \frac{1}{2}$ =	$8\frac{1}{2} \div 2\frac{1}{4}$ =

5. Find the value of:

a. 106% of \$1250 =

b. 15% more than 140 =

c. 20% less than 180 =

Test on Unit IX

1. A tax rate of \$4.87 per \$100 of assessed valuation is equal to:

1a. _____ **a.** What per cent of the assessed valuation?

1b. _____ **b.** How much on \$1000 of assessed valuation?

2. The amount to be raised by taxation is \$480,000. The assessed valuation is 12 million dollars. What is the tax rate in per cent?

2. _____

3. Find the tax on property assessed at \$7,500 when the tax rate is \$5.20 per \$100 of assessed valuation.

3. _____

4. A worker contributes $2\frac{1}{4}\%$ of his earnings to social security. Find the tax for social security when his earnings are: **a.** \$3,600 a year

4a. _____

4b. _____ **b.** \$4,200 a year.

2.	3.	4.

5. The owner of a car drove it 18,000 miles a year. Allow an average of 15 miles per gallon. How much tax did he pay yearly on the gasoline at an average of 8¢ a gallon?

5. _____

6. A watch is marked \$77.50. Find the total cost which includes a federal tax of 10% plus a sales' tax of 2%.

6. _____

7. A rail fare is \$55.70 and the Pullman fare is \$17.40. There is a federal tax of 10% on both fares. Find the total cost of a ticket including Pullman fare.

7. _____

5.	6.	7.

Unit X. Ratio, Measurement, and Equations

I. Ratio of Two Numbers (315)

The ratio of two numbers may be a proper fraction, an improper fraction, or a whole number.

Find the ratios of the following:

	a		b	
1.	A quart to a gallon	____	One pound to 10 oz.	____
2.	8 oz. to 1 lb.	____	15 in. to 1 ft.	____
3.	6 qt. to 1 gal.	____	440 yd. to 1 mi.	____
4.	1 yd. to 36 in.	____	A peck to a bushel	____
5.	12 fl. oz. to 1 pt.	____	32 fl. oz. to 1 qt.	____
6.	6 mm. to 1 cm.	____	75 cm. to 1 m.	____
7.	36 min. to 1 hr.	____	60 sec. to 1 min.	____
8.	1 lb. to 24 oz.	____	12 ft. to 2 yd.	____
9.	72 sq. in. to 1 sq. ft.	____	18 cu. ft. to 1 cu. yd.	____
10.	6 sq. ft. to 1 sq. yd.	____	64 fl. oz. to 1 gal.	____

II. Problems Using Ratios (315)

1. The width of a rectangle is 5 feet and the length is 8 feet. **a.** What is the ratio of the length to the width? **b.** What is the ratio of the width to the length? **1a.** ____ **1b.** ____

2. Use the ratio of the rectangle in problem **1.** **a.** Find the length of a rectangle if the width is 15 feet. **b.** Find the width if the length is 40 feet. **2a.** ____ **2b.** ____

3. One number is 75% of another number. **a.** What is the ratio of the smaller number to the larger number? **b.** What is the ratio of the larger number to the smaller number? **3a.** ____ **3b.** ____

4. The speed limit on a highway is 50 m.p.h. A car is traveling at 60 m.p.h. Express the ratio of the actual speed to the legal speed as a per cent. **4.** ____

Applications of Ratios (318)

1. An orange drink is made from 1 part of frozen orange juice and 3 parts of water. From these facts, find the missing numbers:

	Frozen Juice	Water	Orange Drink		Frozen Juice	Water	Orange Drink
a.	2 pt.	_____	_____	d.	_____	_____	4 qt.
b.	_____	6 glasses	_____	e.	2 cups	_____	_____
c.	_____	_____	12 pt.	f.	_____	12 fl. oz.	_____

2. A recipe for making jam calls for 4 parts of sugar to 5 parts of berries. How many pints of berries would be needed to make 18 pints of jam?

2. _____

1.	2.

3. A photograph 3″ × 4″ is "blown up" so that the length is 10 inches. What is the width of the enlarged picture?

3. _____

4. The ratio of the diameters of two circles is $\frac{3}{4}$. If the circumference of the larger circle is 88 inches, what is the circumference of the smaller circle?

4. _____

5. The cost of 600 gallons of fuel oil is $85.20. At that rate what would be the cost of 1,800 gallons of the oil?

5. _____

6. A car travelled 100 miles in $2\frac{1}{4}$ hours. At that rate, how many hours would it take for a trip of 250 miles?

6. _____

3.	4.	5.	6.

Finding Heights From Shadows (320)

Find the missing numbers in the following:

	a Height of a Stick	b Length of Stick's Shadow	c Ratio of a to b	d Length of Object's Shadow	e Height of Object
1.	5 ft.	8 ft.	_____	40 ft.	_____
2.	6 ft.	5 ft.	_____	60 ft.	_____
3.	10 ft.	7 ft.	_____	70 ft.	_____
4.	3 ft.	42 in.	_____	84 ft.	_____
5.	8 ft.	_____	$\frac{4}{5}$	120 ft.	_____
6.	_____	15 ft.	$\frac{2}{3}$	360 ft.	_____

1.	2.	3.	4.	5.	6.

7. A telephone pole casts a shadow 36 feet long at the same time a yardstick casts a shadow 4 feet long. What is the height of the pole? 7. _____

8. The ratio of the height of an object to the length of its shadow is $\frac{5}{9}$. What is the height of a tree when the length of its shadow is 90 feet? 8. _____

9. A flagpole known to be 75 feet casts a shadow 60 feet long. What is the height of a building which at the same time casts a shadow 110 feet long? 9. _____

7.	8.	9.

I. Solving Equations by the Division Rule (324)

Solve. Write the answers on the blanks.

	a	b	c
1.	$4x = 20$ 5	$5x = 60$	$7x = 56$
2.	$3n = 72$	$2n = 90$	$8n = 88$
3.	$75 = 15x$	$45 = 3p$	$9 = 6c$
4.	$82 = 10y$	$78 = 3k$	$1 = 5t$
5.	$2x = \frac{2}{3}$	$\frac{4}{5} = 2x$	$\frac{9}{10} = 3x$
6.	$3x = 1$	$4y = 2$	$2z = 3$
7.	$4x = .12$	$5x = 2.5$	$7y = 4.9$

II. Solving Equations by the Multiplication Rule (325)

	a	b	c
1.	$\frac{x}{4} = 3$ 12	$\frac{x}{2} = 9$	$\frac{x}{6} = 8$
2.	$\frac{y}{7} = 7$	$\frac{z}{4} = 8$	$\frac{n}{9} = 6$
3.	$\frac{p}{4} = 8$	$\frac{p}{5} = 9$	$\frac{t}{6} = 0$
4.	$7 = \frac{x}{5}$	$18 = \frac{n}{2}$	$75 = \frac{x}{3}$
5.	$\frac{x}{4} = 1\frac{1}{2}$	$\frac{x}{6} = 2\frac{1}{3}$	$\frac{n}{8} = 3\frac{1}{2}$
6.	$\frac{y}{4} = 1.2$	$\frac{z}{5} = 2.5$	$\frac{h}{10} = 3.7$
7.	$\frac{t}{8} = .2$	$\frac{k}{4} = .9$	$\frac{y}{2} = 1.5$

I. Solving Equations by the Addition Rule (326)

Solve. Write the answers on the blanks.

	a	b	c
1.	$x - 5 = 7$ 12	$x - 3 = 8$ ____	$x - 11 = 9$ ____
2.	$n - 1 = 15$ ____	$n - 10 = 10$ ____	$n - 16 = 7$ ____
3.	$n - 8 = 8$ ____	$n - 15 = 14$ ____	$n - 7 = 0$ ____
4.	$15 = n - 6$ ____	$30 = x - 6$ ____	$14 = p - 11$ ____
5.	$a - \frac{1}{2} = \frac{3}{4}$ ____	$a - \frac{1}{3} = \frac{1}{2}$ ____	$n - \frac{1}{2} = \frac{5}{6}$ ____
6.	$n - 1 = 1.4$ ____	$n - 0.5 = 2.4$ ____	$n - 2.5 = 1.4$ ____
7.	$n - 46 = 53$ ____	$75 = n - 49$ ____	$z - 3.8 = 1.6$ ____

II. Solving Equations by the Subtraction Rule (327)

	a	b	c
1.	$x + 5 = 11$ 6	$n + 8 = 15$ ____	$n + 4 = 16$ ____
2.	$n + 9 = 9$ ____	$y + 12 = 20$ ____	$y + 14 = 15$ ____
3.	$a + 7 = 13$ ____	$n + 11 = 24$ ____	$r + 16 = 25$ ____
4.	$20 = n + 15$ ____	$45 = n + 30$ ____	$75 = n + 55$ ____
5.	$n + \frac{1}{2} = \frac{3}{4}$ ____	$n + \frac{1}{2} = 1$ ____	$n + \frac{5}{6} = \frac{5}{6}$ ____
6.	$4 = n + 3\frac{1}{2}$ ____	$10 = n + 8\frac{1}{3}$ ____	$y + 2\frac{1}{2} = 5$ ____
7.	$p + .4 = .9$ ____	$r + 1.2 = 2.1$ ____	$h + 1.4 = 2.5$ ____

Solving Equations Using Two Rules (328)

Solve. Write the answers on the blanks.

	a		b		c	
1.	$\frac{3x}{4} = 6$ $3x = 24$ $x = 8$	8	$\frac{5x}{6} = 30$		$\frac{7n}{8} = 14$	
2.	$3n + 8 = 14$ $3n = 6$ $n =$		$5x - 7 = 21$		$4p + 7 = 21$	
3.	$8n - 1 = 15$		$\frac{4x}{9} = 6$		$\frac{3p}{5} = 12$	
4.	$\frac{7}{8}x = 21$		$\frac{3}{4}y = 36$		$\frac{3}{8}r = 42$	
5.	$\frac{9x}{10} = 0$		$6x - 17 = 22$		$8a + 20 = 54$	
6.	$9c - 3.1 = 1.4$		$2x - 1\frac{1}{2} = 2\frac{1}{2}$		$3x + \frac{1}{2} = 1\frac{1}{2}$	
7.	$12 = \frac{8x}{9}$		$120 = \frac{3x}{4}$		$60 = \frac{4x}{5}$	
8.	$90 = 4x - 22$		$75 = 3x + 21$		$3x + 2\frac{1}{2} = 4\frac{1}{2}$	

Solving Formulas as Equations (329)

1. Find the length of the rectangle shown. 1. _____

Use the formula $A = lw$ and substitute 54 for A and 6 for w. Solve for l.

Find the missing dimensions of rectangles in the following:

2. A = 108 sq. ft., l = 12 ft., w = ? 2. _____

3. A = 144 sq. in., w = 9 in., l = ? 3. _____

4. A = 480 sq. cm., l = 30 cm., w = ? 4. _____

5. A = 120 sq. yd., l = 15 yd., w = ? 5. _____

Use the formula $V = Bh$. Find the missing numbers:

6. V = 216 cu. in., B = 24 sq. in., h = ? 6. _____

7. V = 512 cu. ft., B = 64 sq. ft., h = ? 7. _____

8. V = 1,750 cu. cm., h = 25 cm., B = ? 8. _____

9. V = 360 cu. ft., h = 12 ft., B = ? 9. _____

Use the formula $C = \pi d$. Find d or r:

10. C = 314 in., π = 3.14, d = ? 10. _____

11. C = 18.84 ft., π = 3.14, d = ? 11. _____

12. C = 12.56 mi., π = 3.14, r = ? 12. _____

13. C = 110 ft., $\pi = 3\frac{1}{7}$, d = ? 13. _____

Square Root of Numbers (332)

1. On the blank below the number write the square of that number:

a.	1	2	3	4	5	6	7	8	9
	____	____	____	____	____	____	____	____	____
b.	10	20	30	40	50	60	70	80	90
	____	____	____	____	____	____	____	____	____

2. From problem **1**, a one-or-two-place number has how many places in its square root? 2. ____

3. A three-or-four-place number has how many places in its square root? 3. ____

4. Write the number of places in the square root of:

a. 729 ____ **c.** 121 ____ **e.** 13,225 ____ **g.** 49 ____

b. 1225 ____ **d.** 2401 ____ **f.** 161,604 ____ **h.** 52,900 ____

5. Write the squares of the following:

a. 12 ____ **c.** 15 ____ **e.** 18 ____ **g.** 11 ____

b. 13 ____ **d.** 25 ____ **f.** 21 ____ **h.** 1.1 ____

6. Write the square roots of:

a. 144 ____ **b.** 225 ____ **c.** 196 ____ **d.** 256 ____

7. Notice the figure in ones' place of the squares in problem **1**. The square of a number must end in 1, 4, 5, 6, 9, or 0. What must be the digit in ones' place of the square root of a number if the number ends:

a. In 1? ____ **c.** In 5? ____ **e.** In 9? ____

b. In 4? ____ **d.** In 6? ____ **f.** In 0? ____

8. From the digit in ones' place, which of the following numbers cannot be a perfect square? 8. ____

a. 676? **b.** 361? **c.** 1225? **d.** 627? **e.** 1024?

Reviewing Per Cent (339)

Find the missing numbers:

	a	b	c
1.	10% of 750 = ____	30 = ____ % of 50	15 = 10% of ____
2.	100% of 27 = ____	75 = ____ % of 60	72 = 6% of ____
3.	103% of 460 = ____	60 = ____ % of 75	6 = 20% of ____
4.	$\frac{3}{4}$% of 480 = ____	80 = ____ % of 400	40 = 50% of ____
5.	$\frac{1}{2}$% of 1740 = ____	17 = ____ % of 51	450 = 150% of ____

6. A team won 18 of the 25 games it played. What per cent of the games played did that team win? 6. ____

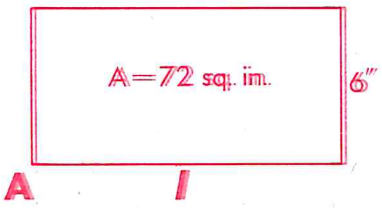
7. It is estimated that 60% of auto fatalities occur at night. At that rate, how many fatal accidents occur at night in a total of 36,380 accidents? 7. ____

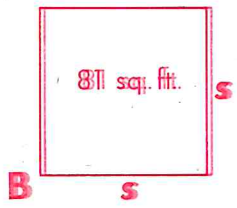
8. The cost of a book at 80% of the regular price was \$3.60. What was the regular price? 8. ____

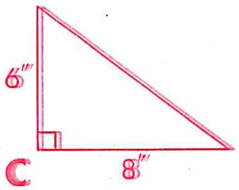
9. A piece of luggage is marked at \$29.50 plus a 2% sales' tax and a 10% federal tax. Find the total cost of the piece of luggage. 9. ____

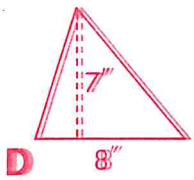
6.	7.	8.	9.

Reviewing Geometric Figures (342)









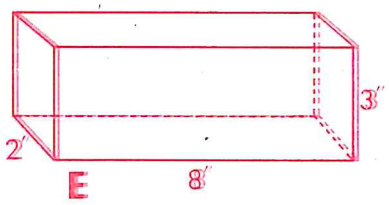
1. Find the missing dimensions in:

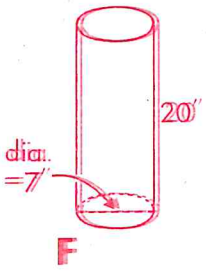
   a. Fig. **A**, l = _____

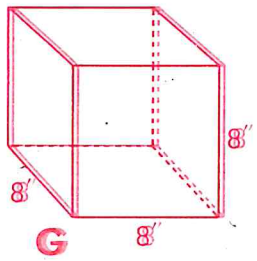
   b. Fig. **B**, s = _____

   c. Fig. **C**, hypotenuse = _____

   d. Fig. **D**, A = _____







2. Use Fig. **E**, **F**, and **G**. Find the following:

2a. _____ a. The volume of **E**

2b. _____ b. The volume of **F** ($\pi = 3\frac{1}{7}$)

2c. _____ c. The volume of **G**

2d. _____ d. The surface of **G**

a.	b.
c.	d.

3. _____ 3. Each of two equal angles of an isosceles triangle is 46°. There are how many degrees in the vertex angle of the triangle?

4. _____ 4. One arm of a right triangle is 5 inches and the other arm is 12 inches. What is the length of the hypotenuse?

5. _____ 5. A rectangle 16 feet long and 4 feet wide is equivalent to a square. What is the side of the square?

6. _____ 6. The area of a circle inscribed in a square is approximately 78% of the area of the square. If the side of the square is 15 inches, what is the area of the inscribed circle?

3.	4.	5.	6.

Practicing the Fundamentals (347)

a	b	c	d	e

1. Add:

a	b	c	d	e
7 6 8 3 8 4 5 9 6 4 5 7 4 2 0 8	4.6 8 9.7 5 7.4 9 8.5 6	$\frac{7}{8}$ $\frac{1}{2}$ $\frac{11}{16}$	$5\frac{1}{3}$ $6\frac{1}{2}$ $7\frac{3}{4}$	11 hr. 52 min. 5 hr. 45 min. 37 min.

2. Subtract:

a	b	c	d	e
5 4,3 6 4 4 8,4 8 6	.5 3 5 .1 5 8	$7\frac{1}{2}$ $2\frac{5}{8}$	$14\frac{3}{4}$ $9\frac{5}{6}$	4 lb. 7 oz. 1 lb. 12 oz.

3. Multiply:

a	b	c	d	e
6 5 7 4 7	5.4 3.5	$8\ 7\frac{1}{2}$ 9	$4\frac{1}{2} \times 7 =$	$\frac{3}{4} \times \frac{5}{6} \times 3\frac{1}{3} =$

4. Divide:

a	b	c	d	e
$162\overline{)5\ 9,9\ 6\ 7}$	$2.5\overline{)1\ 4}$	$36\overline{)9}$	$2\frac{1}{2} \div \frac{3}{4} =$	$4\frac{2}{3} \div 1\frac{1}{2} =$

5. Find the value of:

a. $\frac{3}{4}\%$ of 1580 =

b. 75 = _____ % of 40

c. 4% of _____ = 20

Test on Unit X

Write the ratios of the following:

	a	b
1.	3 qt. to 1 gal. ____	18 in. to 1 yd. ____
2.	1 lb. to 12 oz. ____	16 fl. oz. to 1 pt. ____
3.	30 cm. to 1 m. ____	20 mm. to 1 cm. ____
4.	24 fl. oz. to 1 qt. ____	48 sq. in. to 1 sq. ft. ____

Solve the following equations:

	a	b	c
5.	$3x = 48$ ____	$\frac{x}{4} = 12$ ____	$n - 5 = 14$ ____
6.	$n + 6 = 9$ ____	$x - 7 = 0$ ____	$\frac{x}{8} = 0.6$ ____
7.	$\frac{3x}{4} = 42$ ____	$5n - 9 = 61$ ____	$7r + 16 = 30$ ____
8.	$4b + 15 = 75$ ____	$\frac{5}{8}x = 120$ ____	$9y - 24 = 39$ ____

9. ____ 9. The ratio of the number of boys to the number of girls in a school is $\frac{5}{6}$. The enrollment is 330. There are how many girls in the school?

10. ____ 10. A stick 5 feet high casts a shadow $7\frac{1}{2}$ feet long. At the same time a tower casts a shadow 90 feet long. What is the height of the tower?

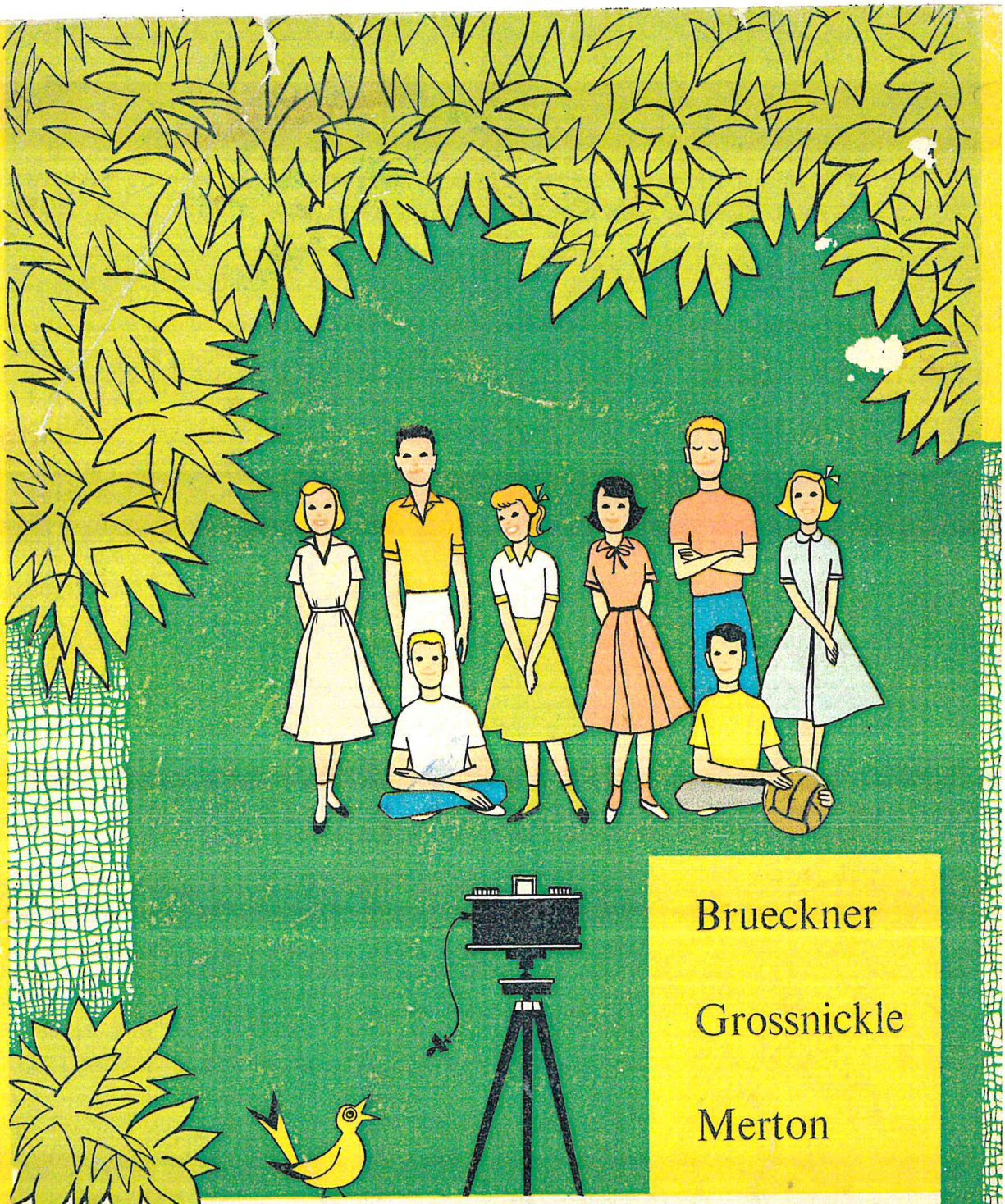
9.	10.

Correlation Chart

This chart shows the correlation between pages in the WINSTON ARITHMETIC PRACTICE 8 and the text, THE NEW KNOWING ABOUT NUMBERS.

Practice 8	Text
1	1
2	2
3	4
4	4
5	7, 8
6	9
7	10
8	13
9	14
10	16
11	17
12	21
13	21
14	22
15	25
16	26
17	28
18	29
19	29
20	34
21	34
22	35
23	36
24	37
25	39
26 Test	
27	45
28	46
29	47
30	49
31	50
32	54
33	55
34	57
35	63
36	66
37	68
38	69
39	70
40	71
41	72
42	78
43	79
44	81
45	82
46 Test	
47	88
48	89, 90
49	90, 91
50	92
51	98
52	99
53	101
54	102
55	105
56	108
57	112
58	115
59	118
60	119
61	120
62	121
63	122
64 Test	
65	130
66	135
67	137
68	139
69	143
70	145
71	147
72	150
73	152
74	154
75	155
76	157
77	159
78	160
79	160
80 Test	
81	166
82	167
83	169
84	171
85	175
86	179
87	185
88 Test	
89	192, 195
90	198
91	200
92	206
93	209
94	212
95	215
96	219
97	223
98 Test	
99	230
100	233
101	235
102	237, 239
103	242
104	244
105	246, 247
106	249
107	250
108	251
109	253
110 Test	
111	262
112	266
113	267
114	268
115	269
116	270
117	272
118	274
119	275
120	280
121	282
122	285
123	286
124 Test	
125	293
126	294
127	294
128	296
129	298
130	302
131	307
132 Test	
133	315
134	318
135	320
136	324, 325
137	326, 327
138	328
139	329
140	332
141	339
142	342
143	347
144 Test	

Art work by Roland V. Shutts



Brueckner

Grossnickle

Merton

Winston Arithmetics